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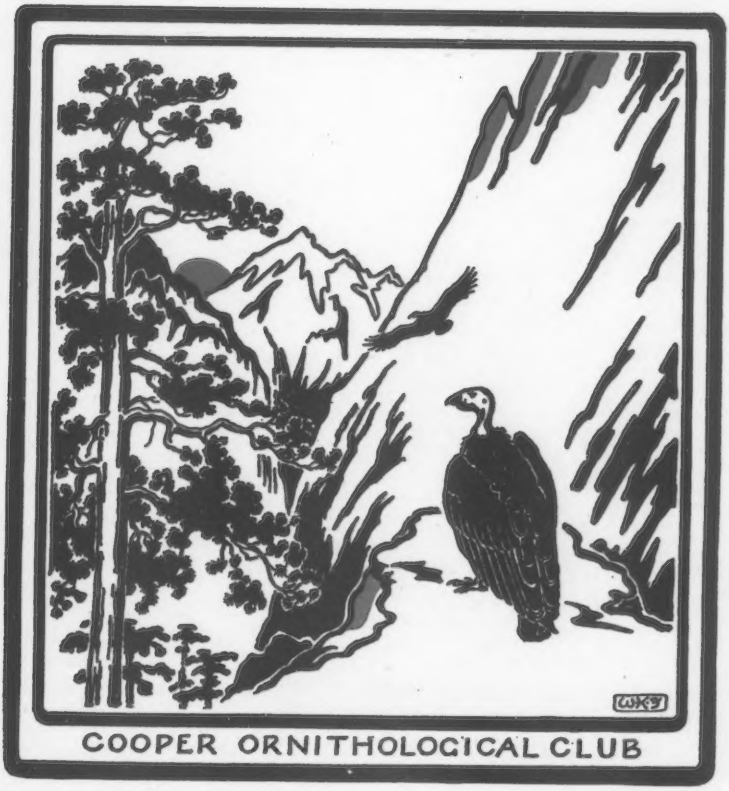

COOPER ORNITHOLOGICAL CLUB

THE CONDOR

A Magazine of Western Ornithology

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THE CONDOR

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TERRITORIALITY AND RELATED PROBLEMS IN NORTH AMERICAN HUMMINGBIRDS

By FRANK A. PITELKA

During late June and July of 1939, a behavior study of the Ruby-throated Hummingbird (*Archilochus colubris*) was made at the Baldwin Bird Research Laboratory at Gates Mills, Ohio. Intensive observations were limited in scope and secondary to the research program of the laboratory; nevertheless, certain informative data about territorial behavior and the relations of the sexes in that species were obtained. Subsequent observations on western species of hummingbirds (especially *Calypte anna, C. costae, Selasphorus alleni,* and *Stellula calliope*) together with a review of literature have enabled me to formulate, at least in tentative form, the main features of territoriality in the North American hummingbirds.

Hudson (1920:3) and Woods (1927:307) have emphasized the uniformity of general life habits among hummingbirds—a uniformity perhaps as extreme as that in any other taxonomic group of similar rank. This fact is conspicuous in the life history monographs of Bendire (1895) and Bent (1940). But observations are interpreted variously and considerable confusion remains as to the significance of certain traits and patterns of hummingbird behavior. Nice's recent review of territory in birds (1941) attests to the need of study of the Trochilidae. Her survey reveals evidence of territoriality in that group, but only a suggestive classification of members of this family was made with respect to types of territory.

In the following pages, the term territory is used in the simplest sense, referring to any defended area (Noble, 1939:267). This definition makes the term available for a more general usage than previously; but at the same time certain precautions may well be emphasized. (1) Among birds, territoriality shows diverse trends and different degrees of development. Attempts to recognize and compare kinds of territories (Nice, 1941) call for many data on the biotic, sociologic, and behavioristic factors which operate to space individuals, pairs, or groups within a habitat. Territories have been classified in terms of the function each appears to perform in the biology of the species—chiefly mating, nesting, feeding or combinations thereof. In the face of this natural trend toward accumulation of particulate data, it is well to remember that to speak of territoriality within a species is to say merely that a member of that species defends an occupied area. (2) Further, in spite of this simplified definition, the term territory generally carries with it certain associations concerning song, display, aggressiveness, and combat. A reciprocal relation of any of these to territoriality is often assumed or implied by particular usage of the term. Yet, one of these traits or patterns of behavior may be well developed without necessarily direct relation to territoriality. Among hummingbirds, for instance, aggressiveness is shown by most individuals and at most times; it may or it may not contribute to the defense of an area. (3) It is difficult to treat territoriality in general terms since the evidence for such behavior is always to be discussed in correlation with differing life requirements

and ecological relations among different groups and species. This indisputable fact is cited by those who question recent attempts to consider territory as a broad, basic problem.

The materials of this paper are presented in two parts: The first deals with details of behavior in the Ruby-throated Hummingbird. The second is a general discussion based on original data and evidence from the literature. This discussion concerns primarily Nearctic species, but certain valuable references on Neotropical species are also included. My own observations on western species were made chiefly in the San Francisco Bay region since 1939 and in Mono and Inyo counties, California, in late May and June of 1942. These observations for the most part only corroborate data already available in the extensive literature and, therefore, are not reported in detail.

Acknowledgment is made gratefully to Mrs. M. M. Nice of Chicago and Dr. S. C. Kendeigh of the University of Illinois for critical reading of the manuscript.

THE RUBY-THROATED HUMMINGBIRD

The present study centers about a single male, his feeding territory, and his relations with other hummingbirds. The intense feeding and territorial activity occurring in mid-summer evenings provided one- to two-hour periods (between 6 and 8 p.m.) of fruitful observation, which was made on ten different evenings between June 21 and July 2. Following the latter date, hummingbird activity subsided and only brief observations were made through July 25. This defines the extent of intensive observations (totalling approximately 25 hours), but repeated visits were made to the study area almost every day in the course of other investigations. Unless otherwise stated, the described behavior occurred during the evenings of the earlier period (through July 2).

The domain.—The feeding territory of the single male Ruby-throat which constistituted the study area covered a semi-formal flower garden approximately one-quarter acre in size (see fig. 66; also Kendeigh, 1941:8-9, and accompanying figures). The garden formed a rectangular, open area bounded by a low wall; an open lawn lay to the south and an orchard to the west, while shrubs and trees bordered the north and east sides. Hummingbirds were attracted here by the tall racemes of larkspur blossoms (*Delphinium*), and the preference shown by several hummers for this species resulted in numerous encounters between each of them and the male who was established here at least from June 21 to July 2. After July 2, defense of the territory subsided when the larkspurs passed their flowering period, and the male was established briefly (at least from July 6 to 9) at a smaller bed of larkspurs that was retarded in blossoming because of shade. (A male, believed to be the one studied, remained about the gardens until July 25.) The latter area was situated along a garden wall some 200 feet to the south of the main territory (see Kendeigh, *loc. cit.*), and during the later days of his occupation of the main territory, the male would absent himself for brief periods that were spent at the fresher larkspurs of the second location. Similar relations of Ruby-throats to food plants are described by Saunders (1936:139). (See also Hudson, 1920:3, on the Argentine Glittering Hummingbird, *Chlorostilbon splendidus;* Grinnell and Storer, 1924:256, on the Calliope Hummingbird, *Stellula calliope;* and Linsdale, 1938:73, on the Broad-tailed Hummingbird, *Selasphorus platycercus.*)

The perches used by the dominant male were tips of four-foot iron rods scattered about the larkspur beds and other higher perches along the margins of the entire feeding area. Each post was occupied for varying periods of several seconds to several minutes between flights and feeding. Changes of post were irregular except for a more frequent

use of the centrally located post A (fig. 66). During the greater part of each day, the male was seen within or in the vicinity of the territory only occasionally.

Attack flights and chases.—The male chased other hummers regardless of sex and often followed an attack flight with a display flight at the site of the outsider's intrusion.

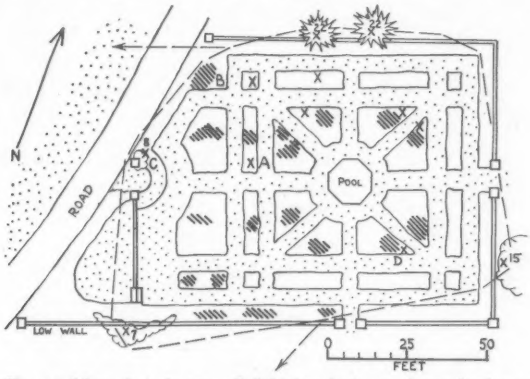

Fig. 66. Map of study area. *Delphinium* beds are shown by heavy diagonal lines. Territorial posts about periphery marked by X's, with figures indicating heights; posts within the garden all four feet high. Dotted areas mark lawn; clear areas within walls, low plants or shrubs. Light broken line circumscribes area of territorial activity.

This latter behavior was shown toward hummers of both sexes. In addition, a sphinx moth and bees were attacked or chased occasionally (see Saunders, 1935:67 and 1936: 152). Fights, that is, actual clashes accompanied by squeaking, occurred between outside hummers about the larkspurs on at least three occasions.

One of the chief stimuli for an attack flight (flight from post to intruder) is the buzzing-humming sound of the wings. Attack flights of 50 to 60 feet were made from posts on which the bird was so perched that it could not see the intruding hummingbird. One exceptional attack flight of about 75 feet was made from perch C to the larkspur beds at D. Feeding was often interrupted and followed abruptly by an attack and chase. On one occasion when a strange hummer passed overhead, the male rose from his feeding, remained poised in the air watching the direction of the passer-by, and then resumed feeding. One 40-foot flight was made toward an intruder that turned out to be a bee. No chase followed, although on another occasion the male hummer actually chased a bee for three feet. At times the bees were fairly abundant and the hummer usually paid no attention to them. Such encounters as occurred followed immediately the return from other encounters with hummers as though the preceding event affected the bird's ability to recognize any differences in the sound of bee flight. Forbush (1927:317) describes a male hummingbird which cleared a feeding area of bees before feeding himself, while Roberts (1936:655) reports clashes of bees and hummingbirds, the bees chasing hummers and the hummers showing great fear of the bees!

Actual attacks were noted only twice: The male was seen to strike a bee and, on another occasion, a female at B, following which he displayed. During the chase of another female, considerable squeaking occurred, and a clash probably took place here,

also. But such contacts occur frequently among hummingbirds when individuals are abundant locally (see Sherman, 1913:154; Bolles, 1894:592; Bowles, 1910:125). Clashes and chases were accompanied by squeaks and high-pitched chatters which were more intense than the occasional chatter given during ordinary flight. The notes of this species correspond in intensity with those of the Allen Hummingbird (*Selasphorus alleni*).

The chases varied in length and usually continued beyond the bounds of the feeding area, although on at least one day (June 24), the male did not fly beyond those bounds. Chases usually were directed toward the open lawn and orchard (area between arrows to the left side of fig. 66). This was due in part to the fact that one persistent female intruder took this as her usual route of escape. The male himself frequented that area outside of the garden and made many of his flights over it in going to the south *Delphinium* patch.

Chases within the feeding area were occasionally interrupted and the male would break off his flight to feed. On one occasion, the male, perched at A, waited 10 seconds while he watched a female moving about larkspur bed B and then made an attack flight and chase. On another occasion he delayed chasing for half a minute. At other times there was another male hummer who fed about the southeast beds; the dominant male failed to detect him and retained his post (A), facing westwardly.

Here it may be repeated that during the day only a weak vigil was maintained. One might more properly say that such clashes as occurred on the feeding area then were merely manifestations of the usual intolerance and belligerence, since clashes and chases were observed about other gardened portions of the estate at various times of the day. But at least during the late afternoon and crepuscular hours (probably also during the morning, although no satisfactory observations were made), a definite surveillance was maintained by the male. This laxity during the day might be explained by the abundance of food in areas in the vicinity of the main territory and by the absence of additional established males. Where food plants are more restricted and where competition is keener, the male may retain his posts continually and observe more definite limits (Saunders, 1936).

Display flights.—Various features of the display or pendulum flights of the Ruby-throated Hummingbird have been described by a number of authors. The dominant male usually performed through 180-degree arcs with amplitudes of 5 to 10 feet. Forbush (1927:318) states that the amplitude may vary from three to forty feet. The plane of the arc was noted to turn as much as 45° about a vertical axis running through the bottom of the arc. Three to six short grating squeaks were given during each swing of a full display flight. At least on one occasion, when an arc of 10-foot amplitude was followed, one complete revolution was made at the end of several swings. Several displays were also performed close to an intruding female within the vegetation so that the back-and-forth flights could be made over a distance of only 10 or 12 inches. Judging from the marked difference in intensity of wing hum in one direction as against the other, it is possible that the male did not turn right-about-face but merely moved forward and then backward. During such performances, the male would rise gradually, the amplitude of the swings would increase as he emerged from the vegetation, and the display would end with arcs of normal distance.

At various times of the day about the garden, display flights were noted, but these were considerably more frequent during the evening hours when vigil was held. On several occasions, two or three performances occurred within one or two minutes. Displays were last seen on July 2. Attack flights were followed by direct chases or by

display flights. The type of behavior at the point of encounter seemed in part, at least, to depend on the response of the intruder. If the latter was reluctant to leave, a display usually followed. If the intruder left during a display, a chase followed (Woods, 1927: 302). Following display flights, the male might (1) fly off wildly up into the air and usually outside of the feeding area to return within the minute to one of the posts, might (2) return directly to a post, leaving the intimidated intruder to make its escape, as in the first case, or might (3) follow a display flight with a chase. On one occasion the male was noted to display before one female and then turn to chase another female intruder (July 2). Displays occurred not only after the attack flights against the individual female, but also at the site of clashes between other hummers within the garden (June 21).

Responses of intruding hummingbirds.—One female frequenting flowers at B repeatedly demonstrated reluctance to leave and came to feed there regularly as well as at other neighboring patches throughout the period of June 21 to July 2. Almost invariably she approached from over the shrubs at the northwest corner. During the earlier evening periods (June 21, 23, etc.), the female usually left promptly after an attack flight and chase by the male. But in the later ones, she exhibited a definite cautiousness in entering the feeding area: her flight was close to the ground; she entered the larkspur beds and then progressed upward onto the larkspur heads to feed; at times she remained poised watching in the direction from which the dominant male usually came. This uneasiness on her part was almost uncanny. She was always alert to the flight-sound of bees and to the rustling noise of wrens near by; on one occasion she even ducked in flight when a bee flew overhead. At such times feeding always was interrupted while she maintained a watch, and indeed her activities within the territory were reduced to short feedings followed by a prompt departure whether or not the male appeared.

When the male approached to chase or display, the female on at least four occasions sought shelter in the lower parts of the vegetation, which prompted the abbreviated display flights already mentioned. In three of these, they left the area in a chase or she left directly after his departure. But during the fourth, while the male swung back and forth through the shortened arc within the vegetation, the female darted at him from beneath three or four times in succession, with her bill poised upward and tail outspread. Following another clash with the dominant male, this female dashed quickly into neighboring conifers; she resumed feeding after this encounter and a minute later the male chased her as she departed of her own volition.

Another male exhibited similar uneasiness in entering the feeding area. On some occasions a chase followed; once he was noted to leave promptly as the dominant male approached.

Territorial function.—The territorial occupancy of the male Ruby-throat was not definite: The male chased intruders over variable distances beyond the limits of the feeding area, often as much as 100 or 150 feet; he did not confine himself to the territory during all routine activity and defended it offensively only during feeding periods. This territorial activity appeared to center about a source of food, although it is probable that mating occurred on the area so that the feeding territory might serve secondarily as a mating station.

There was no nest within the immediate vicinity of any of the feeding areas. One female, which visited the flower heads repeatedly, apparently had a nest in an orchard several hundred feet to the southwest. Saunders (1938:55) observed that the male's territory bore no relation to the female's nest.

Feeding.—The dominant male exhibited a somewhat remarkable efficiency in feeding about the individual patches of larkspur heads, though there was no order in his feeding movements between the various islands. The blossoms of *Delphinium* are arranged in checkerboard fashion about the peduncle. The hummer would progress down usually from the tip, feeding in flowers of two rows and moving left, then right, between alternating blossoms. At the bottom he would turn to either of the adjacent two rows and follow upward in the same fashion, then downward again, so that practically all the blossoms of a single head were visited. There was a 5 to 10 per cent "error" through repetition. At the height of feeding activity and in the absence of interruptions, the male systematically fed thus from one head to another, then moved on to another patch. Flights between patches were always low and usually followed the lawn paths. Both sexes were observed to perch on the flowers to reach inside more effectively.

Insects were picked from the air while the male was perched or while he was flying, the flight being stopped short to seize the prey. Recorded instances of flycatching by hummingbirds are numerous (Mailliard, 1919; Bassett, 1920; and Linsdale, 1938). On several occasions, I have noted the Anna Hummingbird (*Calypte anna*) prey upon swarms of gnats in the manner of a flycatcher.

Summary.—Behavior of the Ruby-throated Hummingbird with particular reference to territoriality and relations of the sexes was studied in northeastern Ohio during late June and July, 1939. Territorial defense by a single male became pronounced during periods of active feeding in the early evening hours. This male maintained an imperfectly defined territory one-quarter acre in size including beds of *Delphinium* which provided food. Territorial activity subsided with the closing of the flowering period of these plants. Prominent posts were maintained by the male during the period of active defense. Other, intruding hummingbirds of both sexes were chased from the area. Display flights of intimidation were performed before intruders who did not leave promptly upon arrival of the established male. Other hummingbirds persisted in entering the territory to feed; their behavior gave evidence of learning, through frequent encounters, of the presence of an established male. A positive reaction of self-protection on the part of an intimidated female is recorded. Several features of feeding behavior are also described.

GENERAL DISCUSSION

General features of behavior.—The general belligerence and intolerance observed in the behavior of the Ruby-throated Hummingbird prevails apparently in all trochilid species on which information is available (Bent, 1940). Fighting occurs not only among the sexes of one species, but as frequently among several species when they occur on a common feeding ground (Henshaw, 1886:76; Ridgway, 1892:278; Moore, 1939*b*:445; for tropical species, see Berlioz, 1932:128 and 1934:420). Numerous attempts have been made to contrast species with respect to these characters of behavior. But my own observations as well as a survey of literature support Wood's statement (1927:304) that a general aggressiveness is characteristic and that there are no constant differences in such traits. Berlioz (1934:420) suggests differences in pugnacity among Brazilian species on which more data are needed.

The independence shown by North American hummers in their activities is so positive that it becomes necessary to doubt any statement suggesting communal or cooperative relationships of any sort except actual mating (Skutch, 1940*a*:33). Stone's comment (1937:648) that "in Hummingbird gatherings, it is always everyone for himself, there is no flocking" is borne out in the literature on practically all species. Dixon

(1912:76) suggests a colonial nesting in the Costa Hummingbird (*Calypte costae*) which is unlikely. Bryant's (1925:100) similar suggestion for the Allen Hummingbird seems unfounded; he found a concentration of nests which, however, may have been accounted for by abundance of suitable habitat for both nesting and feeding. Needless to say, the criteria for colonialism call for more than mere proximity of nests, and the other features of hummingbird behavior do not favor such a thesis. In British Guiana, Nicholson (1931:536) noted that several nests of *Topaza pella* were often close to each other in favorable habitat; but territoriality prevailed.

In no species of hummingbird is the male known to participate normally in nesting activities. This fact has been obscured by observations of members of both sexes on common feeding grounds and of nests close to territorial posts maintained by male hummingbirds. The role of the male as protector to the nest suggested by numerous writers is doubtful. It is astonishing that so recent a work as Todd's (1940:310) states that a "pair (*sic*) of ruby-throated hummingbirds . . . will drive off intruders of their own kind from their chosen domain." All my assembled information agrees with Whittle's statement (1937:172) that, in general, a male's interest in a female one day is not manifested toward the same female the next day. Berlioz (1934:421) has noted the independence of the sexes in certain tropical species, as for example *Thalurania glaucopis*.

Two exceptions to these statements may be cited: Cottam (1941:59) observed a male Calliope Hummingbird feed a female on the nest several times. As regards Neotropical species, Mulsant's statements (1877) that males participate in nest building and incubation may be substantiated in part by future study. In Ecuador, Moore (1939*a*:315) observed male and female of the Violet-ear (*Colibri iolatus*) incubating alternately.

On the basis of this evidence concerning relations of the sexes, one may surmise hummingbirds to be polygamous. This has been suggested by Schlag (1939:17) in the Ruby-throated Hummingbird, Aldrich (1939) in the Allen Hummingbird, and Nicholson (1931*b*:583) in *Topaza pella* of the British Guianan rain forest. Both Schlag and Nicholson observed low ratios of males.

Territoriality.—Evidence of territoriality in hummingbirds appeared as early as 1824, when Bullock described defense of nest surroundings by the Lucifer Hummingbird (*Calothorax lucifer*). In 1877, Henshaw published observations on the defense of the nest and of the male's "vested rights" in the Allen Hummingbird (see also Bendire, 1895:217). In 1892, Anthony noted defense of a feeding area over Agave blossoms by a Rufous Hummingbird (*Selasphorus rufus*) against at least two other species of trochilids.

The first definite and clear statements describing sexual and territorial relations in hummingbirds appear in the studies of Grinnell (1908:73) and Grinnell and Storer (1924:357). In the Calliope Hummingbird, the male does not participate in nesting duties; indeed he is routed from the nest surroundings if he approaches. His location "seems to have no relation to that of a female or an occupied nest." Males maintain feeding territories, but may be seen foraging on "neutral tracts" with other males and females (see also Grinnell, Dixon, and Linsdale, 1930:244).

The male.—All available evidence suggests that territorial behavior of male North American hummingbirds centers around a food supply. This relationship seems most conspicuous in the Ruby-throated Hummingbird, which, while known to feed upon insects, depends extensively upon nectar from flowering plants. In the season and region of breeding, territorial behavior tends to extend over the flowering periods of certain

favored plant species. Such behavior is increasingly positive where individuals are more numerous and competition is keener. Of course the phylogeny of this behavior involves considerably more: (1) Though territoriality might now appear to be concerned with food—a year-around problem, after all—the peak of such activity occurs during the breeding season and its explanation obviously demands more than food considerations. (2) The relation of display flights to territoriality, though direct in its present form, still awaits study with respect to the development of diverse behavioristic traits among the sexes of a species. (3) In all this, more data on reproductive physiology and exact environmental relations are needed before analyses of behavior will begin to take on final form. The fact that maintenance of a territory may coincide with availability of food suggests that whatever the former importance, historically speaking, of courtship and a mating station, these now assume a secondary place. Yet the mating station is the important thing in the survival of the species, and the food and territorial factors may better be said to be conspicuous parts of a complicated mechanism which operates to bring the sexes together.

Aldrich's study (1939) of the Allen Hummingbird led him to recognize two types of territories: (1) a transitory feeding territory of limited extent and time occupancy, as a few square feet of blossoms guarded against neighboring hummers with similar food claims, which may be given up within one or two hours without intrusion or may be taken away by a more aggressive individual; (2) the "semi-definite" territory maintained by resident hummingbirds over suitable feeding areas, which are deserted intermittently, depending apparently on presence of better feeding locations elsewhere, in which case the individual may revert to type one. The territory of the Allen Hummingbird, as in other species of hummingbirds, is set up with no reference to the female, although a nest may be placed within the bounds of the territory.

Territorial limits are not observed as rigidly among hummingbirds as they are in numerous passerine forms. The territory of any male is definable chiefly in terms of the lengths of the attack flights he will undertake to chase an intruder. The chases often extend considerable distances beyond the area which might reasonably be regarded as the territory. But other hummers of both sexes will intrude, especially if the territory includes a good food supply. Males, in absenting themselves from their own territories, may cross territories of other hummers as do females seeking food or nesting material. However, observance of territorial rights has been noted among males in the Central American White-eared Hummingbird, *Hylocharis leucotis* (Skutch, 1940*b*:455).

The above is probably typical of migratory hummingbirds, but in resident forms such as the Anna Hummingbird, posts may be maintained throughout the year, apparently by the same birds (Woods, 1940:383; and the writer's observations). In this as in certain other species, insects are the predominant food (Beal and McAtee, 1922) and there does not seem to be the direct dependency on flowering plants seen in the Ruby-throat and other hummingbirds. The established males appear to hold territorial posts with remarkable permanency; at least certain known posts and territorial sites are occupied practically at all times. Such permanent territories are defended at all times through "song" and chasing; display flights are given almost exclusively during the spring months. But evidence given beyond indicates that migratory species may adopt and defend feeding territories during migration and in regions of winter residence. Even Bullock (1824:264) noted a Jamaican species defending a feeding area in the *non-breeding* season.

Concerning differences between migratory and resident species, data on the non-

migratory, insular form of the Allen Hummingbird (*S. a. sedentarius,* Grinnell, 1929) would be of value. Further studies of such Central American species as the Rieffer Hummingbird (*Amazilia tzacatl*) which nests at all seasons of the year would be informative; Skutch (1940*a*:434) noted, however, that singing of the males of this species subsided in the dry season.

The female.—The female hummingbird performs all nesting duties (Woods, 1924:4; Whittle, 1937:171; Bent, 1940) and maintains a nesting territory. Defense of the nest surroundings by the female against males of the same species has been noted in the Rufous (Finley, 1905:62), Calliope (Grinnell, 1908:74), Anna (Dawson, 1921:940), Black-chinned (*Archilochus alexandri*) (Grinnell and Storer, 1924:353), and Allen (Orr, 1939:17) hummingbirds. Defense, of course, is directed against other birds and animals as well (see Saunders, 1915:113; Chapman, 1928:285; and Schlag, 1930:198).

The female's territory appears limited to the precinct of the nest and from it she makes excursions in search of food. In the Ruby-throat, the female may transgress the male's territory to get food unless food plants are more extensively distributed and are available in the vicinity of the nest; she may then hold a territory of larger extent against neighboring males or females (Saunders, 1936:161). A feeding territory may be maintained by a female with no reference to a nest (Bolles, 1894:591). In *Topaza pella,* Nicholson (1931:536) recognized a territory about the nest, which, however, was not "self-contained" since the female, of necessity, foraged away from this area. In the Black-throated Hummingbird (*Anthracothorax nigricollis*) of Panama, Chapman (1929:133) observed defense of an entire home tree by the female. The females in these various instances display territoriality which approaches that of the males most closely in the case of feeding areas. They exercise belligerence in the vicinity of their nest as well as in occupied feeding areas when other hummers appear. But such territoriality is obviously not as fully developed as that of the male since no posts are maintained and display flights are generally not given.

Further evidences of territoriality (in both or either of the sexes) is available for the following hummingbird species: Costa (Woods, 1924), Rufous (Hammersly, 1928; Aldrich, 1939), Broad-tailed (Woodbury and Sugden, 1938), Heloise, *Atthis heloisa* (Bent, 1940:418), and Guiana King, *Topaza pella* (Nicholson, 1931:538).

Display flights.—The various dives, gyrations, and pendulum flights of hummingbirds are fairly well known. Woods (1927:301) properly questions terming these "nuptial" flights; in *Calypte anna* and *C. costae,* he (1923:198 and 1927:301) observes that the "nuptial" flight is directed toward both sexes of the same species as toward individuals of other hummingbird species. Aldrich (1939) has noted the same in *Selasphorus alleni,* and the reader will recall similar observations already mentioned for *Archilochus colubris.* The territorial significance of display flights seems to lie primarily in their effect as an intimidating device (Dawson, 1929:938). Allen (1934:182) observed that male Ruffed Grouse (*Bonasa umbellus*) display before males as well as females and emphasized the importance of intimidation in such displays. Just as the meaning of song was given a more sound explanation with the development of the concept of territoriality (Nice, 1941:460), so the display flights of male hummers may have meaning in protecting a territory centering about food requirements. Into this territory a female may enter incidentally and through some mode of behavior make known her sexual readiness to the male so that mating ensues. Allen (1934:190) has observed that the occurrence of mating in the Ruffed Grouse is conditioned by the mode of behavior evinced by the intruder upon being intimidated by the characteristic display. The frequent claims of amorous intent attached to the display flights

of hummingbirds by various observers are largely nonsense. Stone's views (1937:648) that aerial flights are of significance only in courtship and that a mid-July performance indicates earlier nesting failure seem to be erroneous.

Woods (1940:372) suggested that the intimidation display of the Anna Hummingbird originated as a "courtship" display. That these displays bear a sexual significance cannot be doubted since the peak of such activity coincides with the peak of gonad development, and display flights may well have had a direct relation to courtship. Among passerines in which nesting duties are shared, the mechanism for bringing the sexes together may operate through courtship and invitation as well as territoriality. But among hummingbirds in which the sexes are independent, the mechanism appears to operate through a territoriality based at least in part on food supply; courtship and invitation are not apparent.

The extension of the territorial interpretation of song to display flights of hummingbirds is supported further by Skutch's interesting differentiation (1940*a*:443) of two "modes of courtship" (or, preferably, territorial defense) among members of that group: the "dynamic" type, exemplified by the Broad-tailed Hummingbird, in which display flights are given; and the "static" type, exemplified by the Rieffer Hummingbird and other Central American species, in which males merely sing or call. Skutch states that so far as he knows, the two types of "courtship" do not occur in the same species. The Anna Hummingbird is a species that practices both types of behavior, the "singing" more frequently than the displaying. The Costa Hummingbird, belonging to the same genus, displays but does not sing. Display as well as calling have been recorded in certain tropical species (Nicholson, 1931*a*; Davis, 1934). The Allen, Calliope, and Ruby-throated hummingbirds do not call or "sing" from their posts. With further study in Mexico and Central America, it may be possible to establish a gradual transition among the numerous species in the proportion of song to display with reference to territorial defense.

Finally, additional support is found in the fact that the displays of the Allen Hummingbird, for instance, are sometimes performed over a territory in the absence of females or other intruders (Aldrich, 1939). The writer has noted this in the Anna Hummingbird, and there are suggestions of the same in the literature on the Ruby-throated Hummingbird, although as regards the last species, the minds of the authors seem so conditioned to the courtship idea that their statements regarding this point are not clear. The various modes of display may, therefore, function in territorial announcement as well as defense. Further, on one occasion, I noted a male Anna Hummingbird "sing" and then display near his post while another male sang some twenty yards away. Thus, territorial competition may stimulate display (Skutch, 1940*b*:455).

In his studies of the White-eared and Heloise hummingbirds, Skutch (1940*b*:453) describes what he terms "singing assemblies." Certain precautions should be heeded in recognizing such assemblies: (1) Concentrations may appear in more favorable habitats. Skutch himself states that in the former species he has never seen more than seven males in a single group, most of the others containing fewer. The individuals within such a group are territorially spaced and scattered lone males also occur. This territoriality seems similar to what Grinnell and Storer (1924:358) describe of normal spacing among male Calliope Hummingbirds. Favorable habitats do not necessarily hold maximum densities of their characteristic birds; and, of course, favorable habitat may be limited locally. (2) Regarding gregariousness, Aldrich (1939) suggests: "Although male Allen Hummingbirds are instinctively solitary because of their belligerency toward other males, their apparent great urge for belligerency in turn makes

them somewhat gregarious. The latter instinct is the stronger, and thus we find males protecting for the sake of combat a small feeding territory in juxtaposition to males with other similar territories." (See also Sherman, 1913:155.)

The foregoing comments, however, merely suggest possible explanations for apparent sociality. That Skutch recognized assemblies of males with probable justification is supported by studies of communal display among the males of tropical hummingbirds. In British Guiana, Nicholson (1931*a*:76) observed groups of up to 20 males of *Phaëthornis superciliosus* all calling more or less continuously and displaying plumage intermittently. Rivalry through more active calling was noted among closely neighboring males. Yet these apparently did not maintain definite posts, as exchanges of perches occurred. At another time, however, a certain territoriality about a perch was observed. Brewster and Chapman (1895:207) observed similar singing assemblies in *Pygmornis longuemareus* and *Phaëthornis guyi* of Trinidad, but in these, the males maintained definite perches to which they returned after encounters with other individuals. It is instructive to note that two instances of solitary display have been recorded in *Phaëthornis superciliosus* (Davis, 1934:733); further, less frequent communal display occurred in a related species, *Pygmornis ruber* (p. 738). No sociality was noted in *Topaza pella* by Nicholson (1931*b*). In most avian species in which communal display occurs, it bears a sexual significance (Winterbottom, 1929); however, there is no evidence for any sexual function in these assemblies of male hummingbirds (Nicholson, 1931*a*:82).

Thus, among the tropical species, certain ones as *Topaza pella* may resemble Nearctic species in territorial relations; but in the latter neither singing assemblies nor plumage display (except gorget and tail expansion) are known. Among the males of the communal species, no suggestion of a feeding territory has yet been made. It is noteworthy that the degree of sociality differs among different species; here is a trend which may be likened to the trend from "singing" to flight display in territorial defense among Central and North American species, as already noted.

In female hummingbirds, display flights have also been observed. According to Bendire (1895:211) and Linsdale (1938:75), the female Broad-tailed Hummingbird may perform the display flight of that species, although the latter author observed these performances to be given only when the male displayed also. Bowles (1910:125) and Poling (1890:403) observed intimidation dives performed by females of the Anna Hummingbird and Rivoli Hummingbird (*Eugenes fulgens*), respectively. Modified, semi-display flights may be given by the female Ruby-throated Hummingbird, also when facing the male (Bent, 1940:336, and Whittle, 1937:171). Such displays appear to be more protective and retaliatory in function than is true in males since, in most instances, females have been noted to behave thus in the presence of enemies or under intimidation by male hummingbirds. In my opinion, displays in which both male and female participate do not mark the height of any courtship but rather the contrary. The female's display may be an effort to resist the male. The female Ruffed Grouse (Allen, 1934:182) is known to display, but here the performance is made to intimidate weaker individuals, regardless of sex.

"Neutral tracts."—At times of subsidence of territorial activity, at least in migratory forms, females may feed freely in the presence of males without a chase or display taking place. Even if a female intrudes in an occupied area, the male may complete a display before a female which then feeds (Grinnell, Dixon, and Linsdale, 1930:244). If the intruder holds his place, no chase occurs (Schlag, 1930:199); if he departs, the display may be interrupted or followed by a chase (Woods, 1927:302; and writer's observations). Furthermore, there may be feeding areas outside those occupied by

males which may be visited by both males and females. Feeding concentrations may occur during migration and before establishment of more definite territories in the spring (Tyler, 1940:334; Aldrich, 1939). Dawson (1923:934) noted a dozen hummers (*Selasphorus rufus*) feeding about a currant bush. Such concentrations occur generally on common feeding grounds in the fall (Grinnell, 1905:384; Taverner and Swales, 1907:137; Woods, 1927:305); however, the individuals of these congregations remain hostile toward each other, and the characteristic belligerence may be manifested to the extent that a sort of vestigial territoriality is seen. An interesting observation was made available to me by Robert W. Storer, who watched eight females and young of Rufous and Broad-tailed hummingbirds about a mass of flowering shrubs on August 17, 1940, in the Medicine Bow Mountains, Wyoming; these birds maintained, at least for brief periods, small areas over the shrubs which they defended against neighbors. Bolles (1894:591) observed two males and one female of the Ruby-throated Hummingbird holding rights over a sap supply resulting from activities of sapsuckers.

Copulation.—The mode of mating has been described variously for hummingbirds, but most of these descriptions, in my opinion, are merely examples of the usual clashes which happen to appear suggestive of actual sexual union (see Ridgway, 1892:279; Knight, 1908:304; Sprot, 1927:71; Arnold, 1930:303; Whittle, 1937:171). It is possible that coition may occur in mid-air (Orr, 1939:19), but there are no sufficiently clear or convincingly complete accounts to confirm this. The most credible description of copulation in hummingbirds is Wyman's (1920:207) of the Calliope Hummingbird. Here, it conforms to the usual avian manner: "A female sat . . . on a horizontal dead weed, when a male shot up the hillside . . . , passed the female, and darted down. . . . As he passed the female, she fluttered and swung head downward on her perch. The male alighted above her, with vibrating wings, and coition took place in this position."

General comments.—At this point, let us review our evidence in terms of the tenets of the theory of territoriality (Nice, 1941:441). Whereas in most passerine species pairs are spaced during the breeding season, in hummingbirds the members of a mated pair are independent. Polygamy probably occurs. The males are generally spaced. The females, likewise spaced, place their nests with no positive relation to male territories and defend at least the nest surroundings. Pugnacity is displayed among all individuals and species of hummingbirds, not just males toward other males of the same species. The displays of the male hummingbird are a warning to other hummingbirds, *whatever the sex*; in the light of our limited evidence, they cannot be regarded as an "invitation to a female." Defense is a paramount feature of territorial occupancy in hummingbirds; announcement and competition through song and display probably occur in at least some species, but more data are needed on these points. Further, hummingbirds do not appear to observe territorial limits as rigidly as do numerous passerine species. A male may defend a certain area; but if so disposed, other hummingbirds of both sexes will enter the territory unhesitatingly unless, as described for the Ruby-throat, there is some learning with reference to the site of an established male through previous encounters with him.

Nice's classification of territories seems to call for an additional category: mating and feeding. This would probably include most male hummingbirds. To be sure, our observations of actual mating in hummers are exceedingly sketchy. But it should be remembered that the conspicuous factor in male territoriality seems to be food supply, not mating as suggested by Nice's mention (1941:462) of "some hummingbirds" under her "type C—mating station only." There can hardly be any doubt that mating occurs

on the feeding territory, since where such behavior has been recorded, it occurred at the site of display flights, the site of territorial defense. The female territory is Nice's "type D—restricted to narrow surroundings of nest," though a reservation should be added regarding possible enlargement, especially to include a feeding area, as mentioned above.

Clearly the aggressiveness of hummingbirds is a general feature of their behavior displayed by most individuals and at most times. Its part in defense of an occupied area seems secondary, since territoriality hinges about attachment and relative confinement to a more or less specific area. Yet, if the trait contributes to defense of an area, it becomes a part of the mechanism functioning to space individuals (Noble, 1939:267).

It is therefore questionable whether hummingbirds may be said to demonstrate a hypertrophy of territorial behavior in terms of the increased pugnacity and positive defense of territory (Nice, 1941:469). The apparent hypertrophy is merely a manifestation of normal aggressiveness. The belligerence of the male is not to be associated with such protective instinct for mate, nest, or young as is displayed by males of many passerine species. If we may evaluate the importance of territories in hummingbirds on the basis of our present knowledge, in males of most species it may be said to be based on a food supply and to serve in the defense of the individual only; in the female, it is based on a protection of nest and young and serves in their defense as well as that of the individual.

Summary.—Belligerence and intolerance characterize the behavior of most trochilid species. In at least North American species, the independence of individuals is conspicuous, and except for mating, the sexes bear no relation to each other. The male hummingbird, who probably is polygamous, maintains a territory centering about a food supply; secondarily the territory may serve as a mating station. Length of occupancy and definiteness of territorial claims depend, among other things, on type of food involved and seasonal status of the species. There is imperfect observance of territorial boundaries. Defense is the chief feature of hummingbird territoriality; announcement and competition through song and display occur less frequently. The female maintains a nesting territory. Both sexes may maintain feeding territories of varying extent and transitory occupancy, probably at all times of the year. The display flights of hummingbirds are essentially an intimidation device. In addition, their function in territoriality may be compared with certain aspects of song in passerine species. The female display is probably a protective device.

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NOTES ON THE GROWTH AND PLUMAGES OF THE BLACK OYSTER-CATCHER

By J. DAN WEBSTER

While the writer was making a study of the Black Oyster-catcher (*Haematopus bachmani*) in the course of his work at Cornell University and in the field at Sitka, Alaska, he obtained some scattered data on physical characteristics which have not been previously reported. Dr. Arthur A. Allen contributed much important advice concerning this work and David Webster helped with the hard labor of field study in a rowboat.

Fig. 67. Newly hatched Black Oyster-catchers.

First week.—The newly-hatched chick is brooded continuously for the first thirty-six hours, during which time the down dries out and becomes fluffy and the pendant yolk sac is resorbed. In the first two days, the weight drops until feeding begins thirty-six to forty-eight hours after hatching. At first the upper mandible is decurved, almost hooked at the tip (see Grinnell, Univ. Calif. Publ. Zool., 5, 1910:379). Flesh colors of two day-old chicks on Kayak Island, Sitka Sound, on June 11, 1940, were noted as: lining of mouth, orange buff; bill, black; gape, yellowish; egg tooth, white; feet and tarsi, buffy gray; iris, dark brown. (In this paper, capitalized color names are used where the part in question of a freshly-killed bird was compared with Ridgway's "Color

Fig. 68. Chicks seven days old.

Standards" (1912); non-capitalized color names may not conform to Ridgway's nomenclature, and are used where such comparison was not made.)

The dense natal down is swarthy, presenting a pepper and salt effect. Although the down of the back is basically Black or Drab, tipped narrowly with Ochraceous Buff, the general pattern of the upper parts consists of an indistinct loral and postocular Black stripe and a very indistinct median crown stripe of Black which merge on the nape. Two broad, distinct stripes continue down the back and end at the rump. The tail and an area at the top of each thigh are Black; the flanks and the lighter areas of

Fig. 69. A chick two weeks old.

the upper parts are a mottled Drab. The down of the underparts is dull gray, varying from Dark Mouse Gray on the foreneck to White in a triangular belly patch (see Grinnell, *loc. cit.*, and Bent, U. S. Nat. Mus. Bull. 146, 1929:321).

Second week.—The white, calcareous egg tooth drops off the bill between the seventh and twelfth days. By the eighth day the down begins to wear off along the middorsal line, leaving a bare strip of skin; later, about the twelfth day, another bare

Fig. 70. Young oyster-catcher three weeks old.

strip begins to show on either side parallel to the first one and along the ridge of the ilium. The bill becomes pointed, rather than hooked, and it lengthens rapidly. The juvenal plumage develops on the flanks and underparts, and the primaries pierce the skin, although they do not show unless the natal down is parted and lifted. Each of five chicks more than doubled in weight during this week.

Flesh colors noted on a fourteen-day-old chick were: proximal one-third of bill, orange-brown; median one-third of bill, yellow; distal one-third of bill, black; feet and tarsi, pale gray.

Third week.—Although the general color effect is still gray or drab, the dark juvenal plumage becomes conspicuous by the end of this week; juvenal primaries, secondaries, secondary coverts, scapulars, rectrices, auriculars, and feathers of the pileum appear. The bill lengthens somewhat more slowly than previously.

Growth of Oyster-catcher Chicks in Sitka Sound in 1940

Leg band of chick	Day of life	Wt. in grams	Culmen in mm.	Leg band of chick	Day of life	Wt. in grams	Culmen in mm.
White left	1	33.9	14		14	144	31
	3	32.7	17		*23	240	42
	6	43.9	19	Red right	1	.....	15
	7	52.7	19		*6	39.2	19
	*10	76.1	23	Green right	1	.....	15
Red right	1	33.3	14		*6	35.0	18
	3	33.2	17	33	4	38.0	18
	6	46.0	19		11	101.0	24
	*7	49.3	19		*19	205	35
9	6	.....	21	5	4	36.4	18
	7	65.0	22		11	99.5	25
	14	158	30		*19	190	36
	21	248	36	8	2	.....	16
	29	328	42		7	49.2	19
	35	396	50		14	115	28
15	6	.....	21		21	173	32
	7	61.2	22		*27	243	42
	14	147	31	31	35†	380	49
	21	232	37	(Female;			
	29	316	44	CU flat skin)	60	344	55
	35	377	49	50	30	.....	44
28	4	.....	17	(Female;			
	8	.....	23	CU 7889)	70	601	72

*Last day on which the chick in question could be found.
†In captivity thereafter.

The hatching days of all these chicks except the two banded 31 and 50 were known exactly. Ten more chicks in addition to these twelve were examined one or more times in the field, but the data were thought not to be worth including because the hatching dates were not known.

Fourth week.—Dark plumage covers the median line, progressively erasing the white area on the underparts. Much fuzzy down remains on the tips of the feathers, particularly about the rump and neck. The under side of the neck, the flanks and the legs remain downy. The eye ring is dull orange-brown in color although it is as yet very narrow.

Fifth week.—During the fifth week the flight feathers lengthen rapidly, the down wears off the tips of the body feathers to a large extent, and the juvenal plumage becomes virtually complete, except in small areas on the inner sides of the thighs, at the sides of the base of the neck, and under the chin. The eye ring becomes brighter

Fig. 71. Juvenile four weeks old.

and more prominent. Flesh colors in thirty-five-day-old chicks were noted as: distal two centimeters of bill, brownish black; median centimeter of bill, yellow-brown; proximal two centimeters of bill, orange; feet and tarsi, grayish white with a tinge of very pale rose; eye ring, brownish orange; iris, orange-brown.

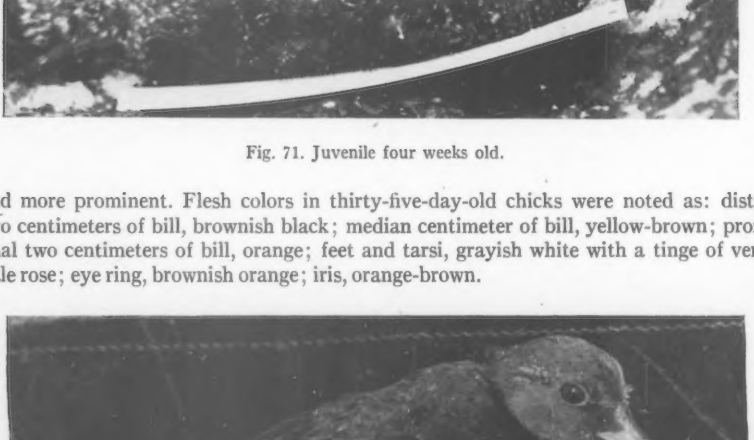

Fig. 72. Juvenile almost ready to fly; five weeks old.

Sixth week.—The juvenal plumage becomes fully developed, but natal down remains on the tips of the feathers of the inner sides of the thighs.

The fresh juvenal plumage is essentially the same as the adult winter plumage: Bluish Black on the head and neck, Blackish Brown (3) on the body, Gull Gray to Slate Color on the under wing. The feathers of the anal ring, however, are white, tipped

with Tawny; and the feathers of the belly, crissum, lower back, and the scapulars, femorals, and upper wing coverts are edged more or less narrowly with Tawny.

Six weeks to three months.—As the young bird grows older, the brownish feather tippings fade, becoming successively Tawny, Ochraceous Buff, Light Ochraceous Buff, Pale Ochraceous Buff, and White until they finally wear off. In a specimen of three months' age, the tippings are almost gone from the back and upper belly and are narrow elsewhere. At about two months the bill becomes truncated, but it does not assume full adult proportions until the bird is at least six months of age. The eye ring is brilliant and prominent in a bird of two months' age. Flesh colors of a specimen collected at the age of seventy days were noted as: distal half of bill, black; median portion of bill, grades into yellow-brown; basal three centimeters of maxilla, orange-brown; gape and basal three centimeters of mandible, orange; feet and tarsi, white; eye ring, orange; iris, yellow-brown. Specimens examined and assigned to this age group had collection dates ranging from August 4 to September 27.

Three months to one year.—Bent (*op. cit.*: 313, 322) finds that the American Oyster-catcher (*Haematopus palliatus palliatus*) has a partial postjuvenal molt in the fall, involving the body plumage, some of the scapulars and some of the wing coverts, and that in the first spring there is what he calls a prenuptial molt into full adult plumage. He also intimates that the molts of the juvenal Black Oyster-catcher are similar.

Fourteen pertinent specimens of *bachmani* were examined by the writer, varying in collection dates from December 2 of the year in which the bird was hatched to August 20 of the year following. This last bird betrayed its age by a few juvenal rectrices; its molt was far behind that of most yearlings; otherwise the latest bird collected which still showed juvenal plumage was dated June 29. Color comparisons were made with four yearling specimens collected by J. B. Semple on May 26, 1934, on Vancouver Island and graciously loaned by the Carnegie Museum.

The juvenal plumage, as stated above, is, like the adult winter plumage, basically Blackish Brown (3) in color. But during the winter there is a postjuvenal molt extending from January to March, and the replacing feathers are Clove Brown, as in the adult nuptial plumage. This partial postjuvenal molt includes some or most of the plumage of the back, rump, breast, and flanks, and the scapulars, the outer tertials, the axillars, the upper and under tail coverts, and probably the plumage of the head and neck. It does not include the flight feathers, the wing coverts, the belly feathers, the femorals, and scattered body feathers.

The partial postjuvenal molt, which extends into the period used by some species for a prenuptial molt, brings the bird into what might be called its first nuptial plumage. Because they do not breed, yearling birds are ready very soon for the first postnuptial molt. This is begun as early as May, and continues until June, July, or even August. As with all other birds, this first postnuptial molt is complete, involving all the feathers; it brings the bird into its second or adult winter plumage. In this plumage there are no feather edgings, save of white on the lower belly, and the anal ring feathers are dark.

On the label of a juvenile he collected on December 30, 1919, George Willett wrote, "Bill and eyelids vermilion; iris orange." The bill and eye ring, then, had assumed their adult colors and the iris was well on its way. There seems to be a good deal of variability in the time of the assumption of the adult bill color, as can be seen from the dried skins. Although Willett's December specimen had a vermilion bill, one specimen taken on June 1 had a bill which had evidently been orange proximally and blackish brown distally. Probably the average young bird has a bill in May that is only slightly

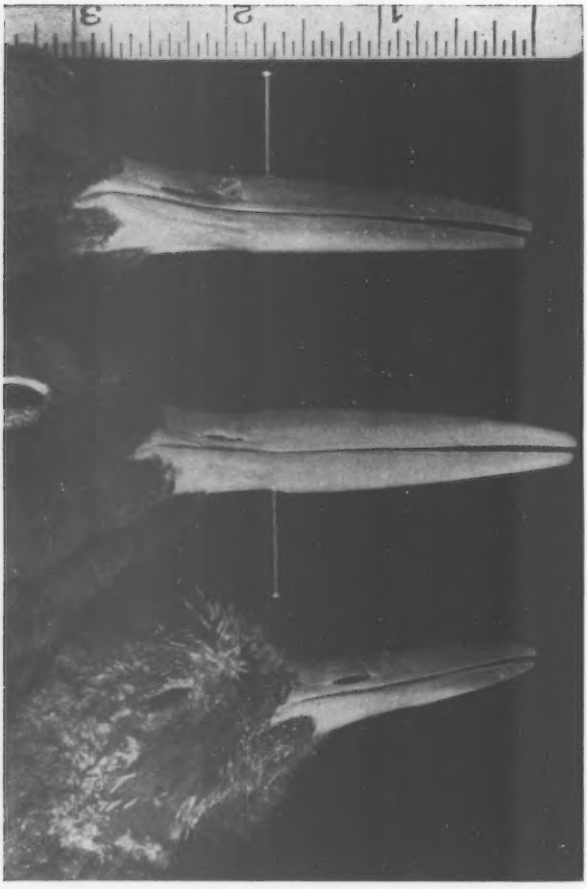

Fig. 73. Bills of Black Oyster-catchers taken at Sitka, Alaska, in early September, 1940. Top, juvenile 70 days old; middle, adult; bottom, juvenile 30 days old.

tinged with gray or brown in the distal centimeter or two; it loses this small darkened area at the height of the first postnuptial molt in June.

Although most of the females were larger than the males, as is true of adults, the measurements of both sexes were taken together to form the following average dimensions for the fourteen immature specimens here discussed: wing, 240 mm.; culmen, 67 mm.; tail, 98 mm.; tarsus, 50 mm.; greatest depth of bill, 12.3 mm. These averages are, in each case, well below those found for adult males, but a few single measurements were above average for adults of the sex concerned.

Young birds do not breed in their first summer, and probably not in their second summer either (see Dircksen, Jour. für Ornith., 80, 1932:484, and Webster, Wilson Bull., 53, 1941:144).

Adult winter plumage.—The adult winter plumage is acquired by a complete postnuptial molt occurring from May to August in first-year birds or from July to September in mature birds. Several adult birds with missing primaries were seen from July 19 to August 6; specimens taken as early as July 19 (Calif. Acad. Sci. nos. 1953 and 1957, San Geronimo Island, Lower California, 1905) and as late as September 29 (Mus. Vert. Zool. 51469, San Miguel Island, California, 1927) were examined in which at least one primary was partly sheathed.

The head and neck are feathered with soft, glossy Bluish Black plumage. On the back there is a sharp demarcation at the anterior end of the dorsal pterylae; through the breast there is a gradation, by means of the colors of the feather tips, into the dull Blackish Brown (3) of the dense belly plumage. The feathers of the breast and, to a lesser extent, of the upper back immediately posterior to the color demarcation each have a subterminal U-shaped line on the blade. Proximal to this line the feather is glossy Blackish Brown (3); distal to this line the feather is dull Bluish Black or dull Blackish Brown (3), or a dull intermediate color. Back plumage, rump plumage, upper tail coverts, scapulars, axillars, upper wing coverts, upper surfaces of the secondaries, under tail coverts, crissum plumage, femorals, and belly plumage are Blackish Brown (3). The feathers of the lower belly are tipped narrowly with white. The rectrices, above and below, and the primaries above grade from Blackish Brown (3) proximally to dull Black distally. The under surface of the wing grades from the Gull Gray of the under greater coverts and the proximal portions of the blades of the remiges to Slate Color at the tips of the primaries and to Blackish Brown (3) in the under lesser coverts and marginals. The under surface of the proximal portion of the rachis of each primary is white.

Adult nuptial plumage.—The breeding plumage is acquired by an incomplete prenuptial molt in April and May. There is much variation, some of it geographic, in the extent of the prenuptial molt. Specimens from the Alaskan coast showed a prenuptial molt complete save for the primaries and secondaries. One specimen from Vancouver Island had not molted the outer five pairs of rectrices, and several specimens from California and Lower California had undergone a sketchy molt, involving only scattered body feathers, scapulars and coverts. Thus a few of these southern birds retained much of the white-tipped belly plumage throughout the summer.

The nuptial plumage differs from the winter plumage in the generally lighter tone of the body plumage, as is particularly exemplified by the contrast between two breeding pairs taken at Sitka. The worn, winter-plumaged birds, taken April 1, are much darker than the fresh, nuptial-plumaged oyster-catchers, taken May 22. All of the Blackish Brown (3), save that of the upper tail coverts, whose color remains unchanged, is replaced by the lighter Clove Brown; the Gull Gray of the under greater wing coverts is replaced by the lighter Pale Gull Gray; the feathers of the lower belly are completely without tipping.

Adult flesh colors.—The bill is Flame Scarlet, lightening in the distal centimeter to dull translucent orange or to dull Cadmium Yellow. The mouth and naked eye ring are Flame Scarlet; in a wounded bird, the nictitating membrane was noted to be orange-white. The iris is Lemon Chrome throughout, or more often, Lemon Chrome internally and Cadmium Yellow toward the periphery.

The tarsi and feet are mostly or entirely ivory white; there is sometimes a tinge of Hermosa Pink on the tarsi, and more often a tinge of Hermosa Pink on the toes, particularly in the webs and soles. The nails, in contrast, are gray proximally, darkening to smoky black distally.

The Rice Institute, Houston, Texas, February 21, 1942.

SUCCESSION IN THE CATHARTINE DYNASTY

By LOYE MILLER

Interest in fossil birds in America experienced a very definite revival some thirty odd years ago when the great masses of material began to appear from the Rancho La Brea asphalt. Since then two additional asphalt lenses within the southern California area, supplemented by some thirty or more bird-bearing localities in other parts of the west, have been studied by a dozen workers in avian paleontology. All these data serve to give us a much clearer picture of the ancient bird fauna, and the effect of time upon the organic species has come to occupy a place of much interest in my own ornithological thinking.

The succession of species within the one phyletic group, Cathartae, birds of similar structure, similar food requirements, and similar nesting sites, would illustrate what I mean. There are living today within the borders of the United States three well marked forms of these New World vultures, the California Condor (*Gymnogyps californianus*), the Turkey Vulture (*Cathartes aura*) and the Black Vulture (*Coragyps atratus*). Mexico adds the Royal Vulture (*Sarcoramphus papa*), and South America the Andean Condor (*Vultur gryphus*), thus completing the entire roster of species of the suborder as represented today.

The California fossil beds, however, yield a large number both of species and of individuals of these cathartine birds. The Pleistocene fauna may be tabulated as follows:

Family Teratornithidae (extinct family)

Cathartornis gracilis—extremely rare; from but one locality.

Teratornis merriami—abundant; wide ranging, probably lived to Recent.

Family Cathartidae

Gymnogyps amplus—rare; one locality.

Breagyps clarki—rare; may have lived to early Recent.

Coragyps occidentalis—abundant; wide ranging, may have lived to early Recent.

Gymnogyps californianus—still living, but rare; abundant and wide ranging in Pleistocene.

Cathartes aura—now abundant; wide ranging and subspecifically divided; rare in Pleistocene.

Coragyps atratus—abundant in the tropics; not much subspecific division; very rare in Pleistocene.

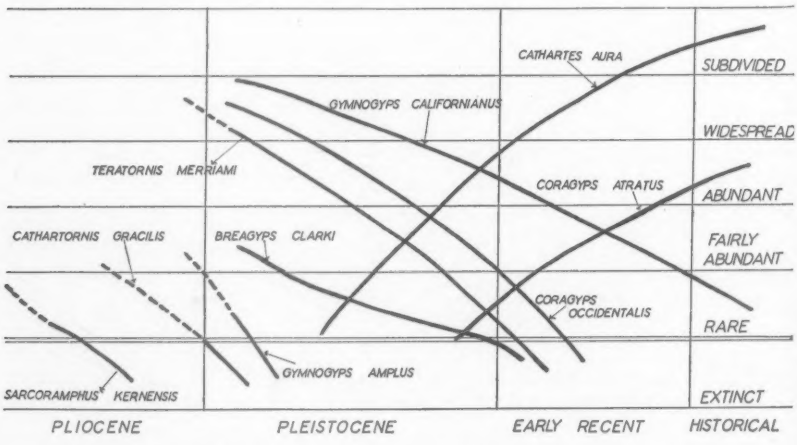

Fig. 74. Diagram showing abundance and geologic history of cathartine vultures.

What caused this come and go of the vultures? Can we avoid the conclusion that *time* is the principal factor? The hypothesis of racial senility is not in the best repute among biologists in general, but the paleontologist is almost obliged to resort to it as a solvent for some of his riddles.

Were not the teratorns an antiquated group that time had weathered away before we arrived? Is not the California Condor a senile species that is far past its prime? It was widely distributed and numerically abundant in Pleistocene time (Florida, Mexico, New Mexico, Texas, Nevada, California), but now it is restricted to one or two localities and a numberable roster of individuals within the two Californias. Is it not a species with one foot and even one wing in the grave? The Turkey Vulture, quite in contrast, was just coming into the Pleistocene picture, although it was definitely important. It now ranges from Canada to the Straits of Magellan. The Black Vulture is merely indicated in the Pleistocene (Florida); it now swarms in the tropics and it seems to be extending its range today from Arizona toward the California border along the Colorado River. Is it not the lusty and aggressive youngster of the cathartid family? May it not in the geologic future replace the Turkey Vulture as we now know it?

The present indication, however, is that the Turkey Vulture will be hard to displace. It is a species of great vigor and versatility and appears to be splitting into a number of potential future species, as we see in the Horned Owl. These offspring species may be the ones to replace at some distant time the present day Turkey Vulture.

I am glad that I shall not be responsible for the taxonomy of that remote period.

University of California at Los Angeles, March 31, 1942.

NOTES ON SOME RACES OF THE ROUGH-WINGED SWALLOW

By PIERCE BRODKORB

Within the last few years a rather extensive literature has appeared on the taxonomy of the Rough-winged Swallow (*Stelgidopteryx ruficollis*). In the course of my work on the birds of southern Mexico, I found certain discrepancies between published statements and some of my material. The present paper developed from an attempt to work out the characters and ranges of the forms occurring in Mexico. Those races which do not reach this region are omitted, since I have nothing to add to Griscom's able review (Proc. New England Zool. Club, 11, 1929:67–72). Although the Mexican material studied is three times as extensive as that available to previous workers, it should be emphasized that in several cases the last word still remains to be said.

A few generalities may be drawn from the characters shown by the different subspecies. In the first place, the Mexican and North American birds are divisible into two groups characterized in part by the normal presence or absence of spots on the crissum. The two groups were at one time thought to be specifically distinct from each other and from the South American forms. All three groups are, however, connected by intermediate forms.

Within these groups the darker races occur in areas of heavy precipitation, and the paler forms inhabit more arid regions. With a few possible exceptions, size tends to increase with high altitude and high latitude. These same trends are noticeable not only among the different subspecies of a given group, but even among populations of the same race.

Stelgidopteryx ruficollis serripennis (Audubon)

Hirundo serripennis Audubon, Orn. Biog., 4 (1938):593 (Charleston, South Carolina).

Stelgidopteryx ruficollis aphractus Oberholser, Sci. Publ. Cleveland Mus. Nat. Hist., 4 (September 19, 1932):5 (Warner Valley, 9 miles south of Adel, Oregon).

Characters.—Medium dark above and below; crissum usually plain white; throat and usually the chin without buff or rufous.

Measurements.—Male (25 specimens from east of the Rockies): wing, 108-116 (110.9); tail, 47.5-54.5 (50.4). Female (13 from east of Rockies): wing, 103-107 (105); tail, 45-48.5 (47.4).

Range.—Southeastern British Columbia, Montana, North Dakota, Minnesota, northern Michigan, southeastern Ontario, New York, and Massachusetts, south to the Gulf States, and west at least to eastern Washington, Oregon, Nevada, and Texas. On migration to California, Sonora, Morelos, Chiapas, Guatemala, British Honduras, and (according to Griscom) to Panama.

Since I have seen only nine adults from the Great Basin, I have been largely guided by the statements of Wetmore (Proc. U. S. Nat. Mus., 86, 1939:202) and Miller (Condor, 43, 1941:259) in including birds from that region with *serripennis*. The characters originally ascribed to *aphractus* were darker upperparts, paler underparts, and somewhat greater average size, compared with *serripennis*. My birds from the Great Basin have the same range of variation in color as do eastern birds. Oberholser included California within the range of *aphractus*. It has since been shown that breeding birds from California belong to the race *psammochrous*, which does in fact have paler underparts than *serripennis*.

One bird from the coast of Oregon, collected on May 30, is very pale. Whether it represents an abnormal variant of *serripennis*, or whether the range of *psammochrous* extends so far north along the coast can only be decided with more adequate material than is available to me. On geographical grounds the first alternative is more probable.

As regards size, some 57 per cent of the birds measured from the combined ranges of *serripennis* and *aphractus* can be segregated to locality on wing length. The tail also

tends to be longer in the west, but with weight the trend is reversed. While a difference which holds in only slightly more than half of the specimens is hardly constant enough to warrant recognition of a northwestern race, it would be interesting to see whether a larger sample of Great Basin birds would show greater or lesser differences.

Extreme and average measurements (in mm.) and weights (in grams) of *Stelgidopteryx ruficollis serripennis*

Locality	Sex	Wing	Tail	Weight
East of Mississippi	19 ♂	108-116 (110.7)	47-54 (50.2)	14.5-18.2 (16.2) [8 ♂]
Great Plains	6 ♂	108-113 (111.7)	48-54 (51)	.....
Great Basin	5 ♂	111-118 (115.4)	49-52 (51.6)	15.1-16.6 (15.7) [4 ♂]
East of Mississippi	11 ♀	103-107 (104.9)	45-48 (47.3)	15.7-16.5 (16.1) [2 ♀]
Great Plains	2 ♀	105	48	.....
Great Basin	4 ♀	106-109 (107.5)	46-50 (47.4)	14.4 [1 ♀]

Although the crissum is usually plain white, the shafts of the longer under tail coverts are occasionally darkened subterminally, and about one bird in four (23 per cent of those examined) has the dark shaft area expanded into a spot on the feather. Bangs and Peters (Bull. Mus. Comp. Zool., 67, 1927:479) reported 16 out of 64 specimens (25 per cent) with spotted under tail coverts. Griscom (*op. cit.*: 72), though incorporating the same material used by Bangs and Peters, found spotted tail coverts in only three specimens among "nearly two hundred."

Material examined.—Seventy specimens from British Columbia (Trail, Vernon, and Midway), eastern Washington (Okanogan County), Nevada, Idaho, Montana, Wyoming, the Dakotas, Texas, Kansas, Ontario, Michigan, New York, and Pennsylvania; and migrants from California (Eagle Borax, Imperial County, April 21), Sonora (Tesia, March 14), Morelos (Cuernavaca, March 16), Chiapas (Pijijiapan, April 27-May 3), Guatemala (Panzós, February 23), and British Honduras (Belize, February 5). One from near Tillamook, Oregon, is also tentatively assigned here.

Stelgidopteryx ruficollis psammochrous Griscom

Stelgidopteryx ruficollis psammochrous Griscom, Proc. New England Zool. Club, 11 (December 14, 1929):72 (Oposura, Sonora).

Characters.—Paler above and below than *serripennis*; size about the same. Young slightly paler above than young *serripennis*.

Measurements.—Male (12 specimens): wing, 106-118 (112.2); tail, 45.5-52 (49.8). Female (5 specimens): wing, 104.5-109 (107.1); tail, 46.5-49 (48.1).

Range.—Southern California and Arizona, south in the Pacific drainage to Guerrero, and north along the coast at least to Los Angeles County, California. Migrates southward along the coast to Chiapas.

Originally described from Sonora, *psammochrous* was shown to be the form of southern Arizona by Oberholser (Sci. Publ. Cleveland Mus. Nat. Hist., 4, 1932:5) and of California by Wetmore (*loc. cit.*). Van Rossem (Trans. San Diego Soc. Nat. Hist., 6, 1931:268; Bull. Mus. Comp. Zool., 77, 1934:452) has stated that he was unable to distinguish *psammochrous* from *serripennis*, but he now writes (*in litt.*, April 5, 1942) that he considers it a good race with a range extending into California. Hellmayr (Cat. Birds Americas, pt. 8, 1935:47–48) also refused to recognize *psammochrous*. It appears that the reluctance to accept this race was largely due to the fact that at the time its range was not understood to be so extensive.

Of the seventeen adult specimens examined from north of Guerrero, not one has a spotted crissum, although a few individuals have subterminally darkened shafts of the longer under tail coverts.

Intergradation with *fulvipennis* occurs in Guerrero. Five breeding specimens from Chilpancingo and Omilteme have the paler underparts of *psammochrous*, but they have more rufous on the throat than that form. Above, three are pale and the other two are about as dark as *serripennis*. One bird has a large dusky spot on the crissum. Since

the size of these birds is a little larger than that of *fulvipennis* or *psammochrous*, or for that matter of *serripennis*, there remains the possibility that still another race will need to be established to accommodate these birds. The wing measures 116.5–120.5 (119.7) in three males, 105–108 mm. in two females. The tail in the males is 50.5–53.5 (52), in the females 46–48 mm.

Material examined.—Twenty-five specimens from California (Los Angeles, Imperial, and Riverside counties), Arizona (Tucson, Continental, Benson, and Fort Verde), Sonora (Tesia and Pilares), Guerrero (Chilpancingo and Omilteme), and Chiapas (Pijijiapan, April 27).

Stelgidopteryx ruficollis fulvipennis (Sclater)

Cotyle fulvipennis Sclater, Proc. Zool. Soc. London, 27 ("1859"=April 1, 1860):364 (vicinity of Jalapa, Veracruz).

Stelgidopteryx salvini Ridgway, Proc. Biol. Soc. Wash., 16 (September 30, 1903):107 (Dueñas, Guatemala).

Characters.—Darker above and below than *serripennis* or *psammochrous*; chin and often the whole throat tinged with rufous or buffy; shafts of under tail coverts usually darkened subterminally, rarely plain white; subterminal dark spots on crissum perhaps not more frequent than in *serripennis*, but when present the spots tend to be darker and larger; secondaries usually with slightly paler edges; size about as in *serripennis* and *psammochrous*. Young perhaps a trifle darker above than young *serripennis* and with the rufous markings everywhere more extensive.

Measurements.—Male (20 specimens); wing, 104-116 (110); tail, 47-53 (49.4). Female (14 specimens): wing, 101-109 (104.8); tail, 43-49 (46.8).

Range.—Lowlands and middle altitudes of southern Mexico and northern Central America, from central Veracruz (Jalapa) and Guerrero, south to El Salvador, Honduras, and (according to Griscom) to Costa Rica. Absent in Yucatan.

Van Rossem (1934, *op. cit.*:394) has shown that the type of *fulvipennis* belongs to the race which Ridgway described under the name *salvini*.

Spotting of the crissum occurs in 24 per cent of the adults examined. It is therefore scarcely more prevalent than with *serripennis*, but the shafts are more often dark in *fulvipennis* than in *serripennis*. Spotting of the crissum appears more frequently in the interior and on the Pacific coast, where it occurs in seven of 18 specimens, than on the Caribbean side, where it was found in only one specimen among the 16 examined.

Griscom (Bull. Mus. Comp. Zool., 75, 1934:392) states that the long wing is the best character for the separation of this form from *serripennis*. It is true that topotypical birds from Jalapa average a trifle larger than specimens from the eastern (though not the western) United States. Nevertheless, on both coasts there appears to be a definite size gradient from larger birds in the north to smaller ones in the south. When specimens from throughout the range of *fulvipennis* are used, the supposed difference in size between the two races disappears.

Extreme and average measurements (in mm.) of *Stelgidopteryx ruficollis fulvipennis*

Locality	Sex	Wing	Tail
Veracruz	3 ♂	111-115 (113.7)	49-51 (50.2)
Tabasco	7 ♂	107-110 (108.2)	47-49 (48.6)
Chiapas	7 ♂	105-115 (110.4)	47-53 (49.9)
El Salvador	3 ♂	104-116 (109.7)	48-50 (49.5)
Veracruz	5 ♀	103-109 (105.5)	43-48 (46.5)
British Honduras	1 ♀	105	48
Chiapas	2 ♀	107-108 (107.5)	47-49 (48)
El Salvador	6 ♀	101-106 (103.3)	44-48 (46.5)

Among breeding birds from El Salvador I find considerable variation in the color of the upperparts, a couple of specimens being even paler than some *serripennis*.

A male from Lancetilla, Honduras, shot on February 8, agrees with *fulvipennis* in color, but its large size (wing, 121; tail 52.5) indicates that it is an intergrade with

the large form of the highlands. This bird is discussed by Peters (Bull. Mus. Comp. Zool., 69, 1929:457) and by Griscom (1929, *op. cit.*:71).

Material examined.—Fifty specimens from Veracruz (Jalapa, Jesús Carranza, and Minatitlán), Tabasco (Balancán, Emiliano Zapata, Tenosique, and Santo Tomás), Chiapas (Pijijiapan, Finca Esperanza, Chicomuselo, and Ixtapa), British Honduras (Cayo), Honduras (Lancetilla), and El Salvador (Volcán de San Miguel and Puerto del Triunfo).

Stelgidopteryx ruficollis ridgwayi Nelson

Stelgidopteryx ridgwayi Nelson, Proc. Biol. Soc. Wash., 14 (September 25, 1901):174 (Chichén Itzá, Yucatan).

Characters.—Upperparts considerably darker than in *fulvipennis*, but anterior underparts much paler (paler even than in *serripennis*); throat pale gray, without rufous; anterior part of loral region whitish, contrasting with the dark crown and even darker spot before the eye; pale edges of secondaries more in contrast with the darker portion of the wings; longer under tail coverts always extensively tipped with sooty brown; size somewhat greater.

Young similar to young *fulvipennis*, but upperparts usually darker, with paler (clay color instead of chestnut) edges to the secondaries; anterior underparts paler and less tinged with rufous; crissum usually tipped with dusky, though the spots are paler and less extensive than in adults.

Measurements.—Male (4 specimens): wing, 113-119 (115.3); tail, 52.5-57 (55.3). Female (4 specimens): wing, 104-107.5 (105.5); tail, 50-52.5 (51.3).

Range.—Resident in northern Yucatan.

Material examined.—Sixteen specimens from Chichén Itzá, Yucatan.

Stelgidopteryx ruficollis stuarti, subsp. nov.

Type.—Univ. Mich. Mus. Zool., No. 98395; adult ♀; Finca Panzamalá, Alta Verapaz, Guatemala, altitude 1230 meters; March 31, 1938; L. C. Stuart.

Characters.—The darkest form of the genus, both above and below. Nearest to *ridgwayi*, with which it agrees in having large blackish tips to the longer under tail coverts, a pale area on the anterior part of the loral region, and pale edgings to the secondaries. Differs by being much darker colored, especially on the underparts; throat tinged with rufous; size somewhat larger.

Differs from *S. r. decolor* Griscom and *S. r. uropygialis* (Lawrence), from Costa Rica southward, in its much darker upperparts with the rump concolor with the back, instead of being whitish; breast and sides somewhat darker; throat only tinged with rufous and dusky, instead of being plain rufous; middle of abdomen white instead of yellow; size larger.

Measurements.—Male (2 specimens): wing, 118-119.5 (118.8); tail, 55.5-56.5 (56). Female (2 specimens): wing, 108-111.5 (109.8); tail, 52-54.5 (53.3).

Range.—Caribbean face of the mountains in southern Veracruz (Motzorongo), and Tabasco (Teapa), Mexico, and in Alta Verapaz (Secanquim, Finca Sepacuité, Finca Panzamalá), Guatemala.

The range of this new form comprises the most humid section of Mexico and northern Central America, with five times as much precipitation as Yucatan. Griscom (1929, *op. cit.*:71) had only one bird from Yucatan, but he noted that it was paler than Guatemalan birds.

The type was shot from a colony breeding in a small cave. Anthony also found this swallow breeding in caves in Verapaz (see Griscom, Bull. Amer. Mus. Nat. Hist., 64, 1932:286).

I take pleasure in naming this swallow for Dr. Laurence C. Stuart, Research Associate in the Division of Herpetology of the University of Michigan Museum of Zoology, who made rather extensive bird collections in Verapaz.

Material examined.—Four specimens from Veracruz (Motzorongo), Tabasco (Teapa), and Alta Verapaz (Finca Panzamalá).

Acknowledgments.—For the loan of pertinent material I am indebted to Dr. Harry C. Oberholser, formerly of the Fish and Wildlife Service, to Mr. James L. Peters and the Museum of Comparative Zoology, to Dr. George M. Sutton and Cornell University, and to Mr. A. J. van Rossem and the Dickey Collections at the University of California at Los Angeles. Acknowledgment is also made to the Board of Governors of the Horace H. Rackham School for Graduate Studies of the University of Michigan for support of the field work of Dr. Stuart and myself in Guatemala and Chiapas, respectively.

Museum of Zoology, Ann Arbor, Michigan, May 28, 1942.

THE STATUS OF THE SKUAS OF THE STATE OF WASHINGTON

By GORDON D. ALCORN

This paper is written at the suggestion of Mr. Adam Balmer, of Westport, Washington, who has in his collection five mounted skuas taken on the coast of Washington. Mr. Balmer was visited by Mr. Ludlow Griscom in July of 1939, at which time Griscom viewed critically the skuas and expressed the opinion that they represented two races. Since skuas are rare birds in the Pacific Northwest and since we have fallen into the habit of calling them *Catharacta chilensis*, Griscom's observations occasioned no small amount of interest. The subsequent examination and measurement of the Balmer birds has proved to us the accuracy of Griscom's diagnosis. In our opinion there is no question but that the birds are of two separate subspecies.

The author wishes to express his appreciation for aid in this study to Mr. Adam Balmer, Mr. Ludlow Griscom, Dr. Robert Cushman Murphy, Dr. Alden H. Miller, Mrs. Martha R. Flahaut, and Dr. George E. Hudson.

Skuas made their first appearance among the birds of Washington in June of 1917, when three were collected off the coast of the state and near-by Vancouver Island by Mr. Stanton Warburton, Jr. (Condor, 20, 1918:179). These birds were made into skins and identified by the late Harry S. Swarth. His opinion was that the birds were the Chilean Skua and they were labeled and tagged *C. chilensis*.

The second appearance of the skua on the coast of Washington was on July 12, 1935, when Mr. Balmer (Murrelet, 16, 1935:70) was brought a bird which we all assumed to be the Chilean Skua. He now has this bird and four others which he secured on August 31, 1936, and on August 16, 1937. Three of these were taken twenty-five miles off the mouth of Grays Harbor (Balmer, Murrelet, 19, 1938:18). The fourth was obtained close in near the harbor entrance. These birds are all mounted and in Balmer's collection and were labeled *C. chilensis*.

Still another skua has been taken on the Washington coast. On July 17, 1939, Dr. George E. Hudson (Murrelet, 20, 1939:71) caught at the water's edge near Grayland a weakened bird which by comparison with the Balmer birds he and Balmer agreed was *C. chilensis*.

It is possible that the skuas are somewhat more common off the coast of Washington than we have heretofore thought. Balmer has over a period of four to five years been able to pick up from the beach in Grays Harbor County at least four additional skuas. These birds were all in a state of decomposition or were injured by gulls to such an extent that it was impossible to make skins of them.

Murphy in his "Oceanic Birds of South America" regards the skuas, both Atlantic and Pacific, as subspecies of one species and lists five and possibly six of them. In this treatment are given careful color descriptions and critical comparative measurements of all the forms. With the Murphy volumes at hand and by careful comparisons of color and measurements I have concluded that the skuas so far collected off the coast of Washington belong to two races, namely, *C. s. antarctica* and *C. s. lönnbergi*. One of the Warburton skins is before me and by use of Ridgway's "Color Standards and Color Nomenclature" the following description is formulated: Chin, throat, and neck light drab paling to drab gray around the throat, the breast and abdomen darkening to hair brown; crown and neck darker than ventral areas of the head, darkening to fuscous across the back and becoming fuscous-black on rump and upper wing surface; tail fuscous-black; middle of primaries white. The measurements of this bird

(see table) and its coloration lead me to think that the Warburton skin which is now in the collection of the Washington State Museum should be identified as *C. s. lönnbergi.*

The male skua collected by Balmer on July 12, 1935, has the chin, throat, and neck fuscous; the center shafts of these feathers are gold, giving a general yellow appearance against the dark background; the dark neck shades to fuscous-black on the breast and abdomen. The crown is fuscous, shading to gold on the lower back of the neck; the back, rump, and wings are almost black. The tail and wings are slightly more brown than the back and the primaries are white in the middle.

Fig. 75. Mounted Falkland Skua (*Catharacta skua antarctica*); male taken July 12, 1935, twenty miles off Grays Harbor, Washington. Photo by Adam Balmer.

The first male skua taken on August 31, 1936, is in coloration much like the bird of July 12, 1939, just described, but it is generally more drab and more uniform in color and shows considerably less gold. The second male of August 31, 1936, is lighter than the foregoing, especially on all the underparts, where the gold is duller and approaches a pale ochre.

The female of August 31, 1936, has the chin, throat, neck, and crown generally hair brown with but a sprinkling of the gold seen in the other birds. The breast and abdomen are drab to hair brown; the back, rump, wings, and tail are fuscous with but a hint of gold; the primaries are white in the middle. This bird has a considerable quantity of gold on the flanks. The male of August 16, 1937, is much like the female of August 31, 1936, but the gold is lighter on the head and neck and the same color is almost wanting on the flanks.

Of the five skuas in the Balmer collection, the last two described should then be referred to *C. s. lönnbergi* and the other three to *C. s. antarctica.* The three *antarctica* are most unusual records for this far northern latitude.

Hudson's bird is now mounted in the Charles R. Conner Museum at Pullman, Washington, and bears the accession number 39-86. I have not examined it and Dr. Hudson is not able to send me a color description based on Ridgway but since I have measurements of his specimen and since he and Balmer compared this bird with Balmer's two small dark skuas, we are of the opinion that Hudson's bird should also be referred to *C. s. antarctica.*

Fig. 76. Mounts of skuas taken twenty-five miles off Grays Harbor, Washington, August 13, 1936. Left, *Catharacta skua antarctica*, male; right, *Catharacta skua lönnbergi*, female.

Through the courtesy of Dr. Murphy and the American Museum I have borrowed from them a series of skuas for comparison with our birds. We thought at first that our small skuas from the northwest might be a dark phase of *C. s. chilensis*. However, measurements and general coloration do not compare favorably with the American Museum skins of this race. Besides lacking light red, our birds consistently average somewhat smaller. This difference in size is not great but it is significant.

Our small northwest birds at first examination did not appear to possess the bulbous form of the bill of *antarctica* which Murphy explains is a "subtle but perfectly distinctive" character "which enables one to distinguish them from any other skuas." The northwest birds we believe do not show to any marked degree this characteristic because the upper bill plate apparently is shed when the birds reach our northern waters. None of our birds of either race possesses this plate but it is apparent that in one of our August specimens it is starting to grow back. The specimens from South America and Little America of the various races possess this plate, which is quite

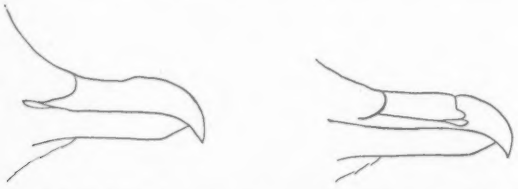

Fig. 77. Bills of *Catharacta skua antarctica*, ½ natural size. Left, male taken off Washington coast, August 31, 1936. Right, no. 44445 Amer. Mus. Nat. Hist., taken October 28, 1915.

obviously loose at its forward edge (fig. 77). Supporting our theory that the upper bill plate might possibly be lost is the fact that all five of the skins in the Balmer collection were just coming out of the molt when taken on the northwest coast during July and August.

Measurements of skuas in millimeters

		Sex	Wing	Exposed culmen	Middle toe with claw	Tarsus	Tail
Balmer birds	*C. s. antarctica* July 12, 1935	♂	359.0	46.0	67.5	60.0	160.0
	C. s. antarctica August 31, 1936	♂	360.0	47.0	67.0	64.0	155.0
	C. s. antarctica August 31, 1936	♂	357.0	46.0	65.0	58.5	151.0
	C. s. lönnbergi August 31, 1936	♀	411.0	48.0	71.0	65.0	170.0
	C. s. lönnbergi August 16, 1937	♂	365.0	45.0	66.0	62.0	142.0
Hudson specimen	*C. s. antarctica* July 17, 1939	♀	400.0	47.0	67.0	61.0	141.0
Wash. State Museum specimen	*C. s. lönnbergi* June 30, 1917	♂	390.0	48.0	70.0	63.0	137.0

Summary.—A critical study of seven skuas taken off the coast of Washington shows that two southern hemisphere races have made their way to this distant northern latitude. The smaller, darker form is *Catharacta skua antarctica* whereas the larger, lighter form is *Catharacta skua lönnbergi*. To date there is a total of nine skuas taken off the coast of Washington and Vancouver Island. Of this total only two (collected by Warburton) have not been included in the present survey.

Aberdeen, Washington, April 15, 1942.

NOTES ON SOME BIRDS OF SOUTHEASTERN ARIZONA

By GALE MONSON

The author was employed in southern Arizona from March, 1939, to October, 1940, with his headquarters at Warren (near Bisbee) and Tucson. During this time he was much afield, and was able to make frequent ornithological observations. The more important of these are the subject of this paper, with the addition of one record obtained in December, 1940, and a few pertinent records by other observers. The records pertain mainly to extensions of known ranges, unseasonable occurrences, early arrivals or late departures, and additional records of species of casual occurrence. All specimens mentioned are in the author's personal collection, unless otherwise indicated. Invaluable assistance in the preparation of the manuscript was received from Allan R. Phillips.

Egretta thula. Brewster Egret. One was seen on January 31, 1940, in a flooded irrigated field at Pomerene, Cochise County, across the San Pedro River from Benson. This is the first published winter record of the species in Arizona, aside from Arnold's (Condor, 44, 1942:183) recent records from Yuma.

Anser albifrons. White-fronted Goose. A dead bird was picked up near a sewage pond on the the Tucson City Farm on June 1, 1939, apparently killed by a trespassing hunter about April 8; it was seen alive by Albert R. Purchase of Tucson in early April. Examination by Phillips establishes the specimen as *A. a. albifrons*, forming the first definite published record of that subspecies for the state. Its measurements were: wing, 403 mm.; tail (rather worn), 112 mm.; exposed culmen, 50 mm.; tarsus, about 75 mm. On October 4, 1940, in company with Albert H. Trowbridge of the Fish and Wildlife Service, I saw a flock of six White-fronted Geese at Aguirre Lake on the Ranchos Buenos Aires in the Altar Valley, north of Sasabe, Pima County.

Nyroca americana. Redhead. Although fall, winter, and spring records of the Redhead from southern Arizona are not infrequent, I do not know of any summer records. A male seen at a small irrigation pond near Hereford, Cochise County, on June 13, 1940, is thus of interest.

Mergus merganser. American Merganser. This bird is sufficiently rare in southern Arizona that a flock of 16 seen on March 12, 1940, on the San Pedro River about four miles north of Hereford, is worth recording.

Buteo swainsoni. Swainson Hawk. The fall departure date of this species in southern Arizona is so poorly known that the following late fall records are of value: three seen north of Sasabe on October 4, 1940; one seen near Fort Huachuca, Cochise County, on October 5, 1939; and a flock of 36 seen in the San Rafael Valley, Santa Cruz County, and two near Elgin, Santa Cruz County, on October 9, 1940.

Asturina plagiata. Mexican Goshawk. One seen just south of Tumacacori Mission, Santa Cruz County, on March 22, 1940, probably a spring arrival; one seen two miles southwest of Patagonia, Santa Cruz County, on May 28, 1940; one streaked juvenile seen two miles southwest of Patagonia on August 8, 1940; and one adult seen along the Santa Cruz River near San Xavier Mission, Pima County, on October 2, 1940, possibly a fall departure date. A February record (1935) for the Baboquivari Mountains, Pima County, which I published (Condor, 38, 1936:176) I am now convinced is a case of mistaken identification, and I wish to retract the record.

Urubitinga anthracina. Mexican Black Hawk. I have the following records from two miles southwest of Patagonia: two seen on March 19, 1940, possibly a spring arrival date; one seen on May 28; and one seen on August 8, 1940.

Polyborus cheriway. Audubon Caracara. One seen on November 22, 1939, at San Miguel on the Papago Indian Reservation, Pima County; and two seen two miles north of Continental, Pima County, on January 13, 1940.

Falco fusco-coerulescens. Aplomado Falcon. One adult observed on November 13, 1939, about four miles southeast of McNeal in the Sulphur Springs Valley, Cochise County. I watched it for several minutes through 6x binoculars at 100 feet distance as it perched on a fence post. The species has not been noted in Arizona in many years.

Numenius americanus. Long-billed Curlew. The following records were obtained: one seen at Hereford on April 4, 1939; flock of eight seen at the Willcox Playa three miles southeast of Cochise, Cochise County, on August 11, 1939; and two seen at Aguirre Lake on the Ranchos Buenos Aires in the Altar Valley on October 4, 1940.

Limnodromus griseus scolopaceus. Long-billed Dowitcher. One adult female was seen at a small

pond just northwest of Tucson on December 31, 1939, and was collected the following day. This is the first winter record for Arizona.

Chlidonias nigra. Black Tern. One was seen at a sewage pond on the Tucson City Farm on June 3, 1939.

Columba fasciata. Band-tailed Pigeon. One was flushed from a nest containing one egg in an oak (*Quercus emoryi*) in the Upper Sonoran chaparral on the Mule Mountains above Bisbee on July 10, 1939. Seven other Band-tails were seen on this date in the same locality. The species has not hitherto been known to nest in these mountains.

Scardafella inca. Inca Dove. Two were seen at Warren on September 25, 1939, and six on October 19, 1939. In the spring and summer of 1940 Inca Doves were noted on almost every occasion when I was in Warren, six appearing to be the number present. No observations were made at Warren during the fall of 1940. These records would seem to be evidence that the bird has extended its range eastward, since it was not seen by me at Warren in the spring and summer of 1939, and it has not been regularly recorded in Cochise County east of the San Pedro Valley.

Speotyto cunicularia. Burrowing Owl. Previous to the virtual extinction of the prairie dog in southeastern Arizona, this bird was perhaps a common resident. At the present time, however, it is very rare during the breeding season. A pair was observed at frequent intervals from May 1 to November 3, 1939, about two miles north of Elfrida in the Sulphur Springs Valley, Cochise County. One to four young were seen at the same place in July, 1939. On August 15, 1940, I saw two at the Randolph Park golf course in Tucson; various people have informed me that these owls had been present all that summer and therefore may have bred there.

Colaptes. Flickers. During the breeding season in southern Arizona *Colaptes cafer* is considered to be restricted to the Transition Zone and *C. chrysoides* is considered a permanent resident of the sahuaro cactus associations in the Lower Sonoran Zone. The following sight records (based only on color beneath wings and tail), therefore, are of interest: *cafer*, seen in willows at Elgin on April 10, 1940, and June 29, 1939; in cottonwoods along the Gila River at Solomonville, Graham County, on May 2, 1939, and at Bryce (near Pima), Graham County, on May 3, 1939; in cottonwoods at Hereford on May 17, 1940, and July 26, 1939; in cottonwoods at St. David, Cochise County, on June 8 and 13, 1939, and on July 18, 1939; and in mesquites near Charleston, Cochise County, on July 12 and 13, 1939. *Chrysoides* was seen near Benson on February 13, 1940; in cottonwoods at St. David on March 1, 1940, on June 9, 13, and 30, 1939, and July 1, 1939; in cottonwoods at Hereford on April 28, 1939, on July 26, 1939, and on September 29, 1939; in east foothills of the Whetstone Mountains, Cochise County, on May 12, 1939; near Johnson, Cochise County, on May 24, 1939; near Dragoon, Cochise County, on May 24, 1940; in willows at Elgin on June 19, 1940, and on June 29, 1939; and near Charleston on July 13, 1939. From some of these observations it may be seen that both red-shafted and yellow-shafted birds are present during the breeding season in the same localities, leading one to the hypothesis that *cafer* and *chrysoides* either breed outside of their supposed ranges or that hybrids are breeding in the areas separating the ranges of the two species. An adult yellow-shafted bird taken on June 19, 1940, near Elgin, is apparently *chrysoides* x *cafer*.

Asyndesmus lewis. Lewis Woodpecker. One was seen in the Mule Mountains above Bisbee on October 13, 1939, and a flock of thirteen (including one adult female collected) was seen in the western foothills of the Huachuca Mountains near Canelo, Santa Cruz County, on October 9, 1940.

Tyrannus vociferans. Cassin Kingbird. Seen at Warren as late as November 3, 4, and 6 in 1939.

Myiarchus tuberculifer olivascens. Olivaceous Flycatcher. A male taken two miles southwest of Patagonia on April 10, 1940, is the earliest published spring record for the state.

Empidonax traillii brewsteri. Traill Flycatcher. A male was taken about 6½ miles south of Broadway along Wilmot Road at Tucson on September 28, 1940. This specimen perhaps indicates the date of fall departure in Arizona. It is just equalled by a record reported by Swarth (Proc. Calif. Acad. Sci., ser. 4, 18, 1929:309).

Camptostoma imberbe. Beardless Flycatcher. A male with greatly enlarged testes was taken two miles southwest of Patagonia on May 28, 1940, indicating that the species breeds in the locality. Two others were seen at the same place on August 8, 1940. Swarth (*op. cit.*:310) has questioned whether it bred at Patagonia.

Petrochelidon albifrons melanogaster. Mexican Cliff Swallow. Two adult females taken from a nesting colony 4½ miles west of Sonoita, Santa Cruz County, on May 29, 1940, and two adult males taken from another colony 9 miles northeast of Douglas on June 12, 1940; all proved to be of this subspecies.

Psaltriparus minimus. Bush-tit. That this Upper Sonoran species occasionally wanders into the Lower Sonoran Zone, even in the summer, is evidenced by a flock of 21 seen in mesquites along a dry wash a few miles west of Charleston on July 13, 1939. The locality is about ten miles air-line from the nearest Upper Sonoran plant life.

Oreoscoptes montanus. Sage Thrasher. A juvenile, fully grown but still in full juvenal plumage, was taken on June 4, 1940, about five miles south of Gleeson, on the west side of the Sulphur Springs Valley, Cochise County. This record is extremely unusual, for I have never before or since met with the species anywhere in southern Arizona during the breeding season, and I know of no other recorded specimens. The date would seem too early for the bird to have been reared in the northern part of the state!

Vireo belli. Bell Vireo. Six were noted, some singing, on September 25, 1940, along the Santa Cruz River near San Xavier Mission. This is the latest date I have noted the species in Arizona.

Vireo solitarius. Solitary Vireo. One was seen at St. David on December 15, 1939, thus extending the winter range of this bird eastward in Arizona to the San Pedro Valley.

Vermivora celata. Orange-crowned Warbler. A female identified as *V. c. lutescens* was taken 2 miles southwest of Patagonia on March 21, 1940. An immature female identified as *V. c. orestera* was taken at the same locality on August 8, 1940. The record of *orestera* represents an unusually early fall arrival and that of *lutescens* seems to be unusual for southern Arizona. Most Arizona records of *lutescens* actually pertain to *orestera* (see Oberholser, Auk, 22, 1905:242-247, and Swarth, Condor, 37, 1935:203).

Vermivora ruficapilla ridgwayi. Calaveras Warbler. Two were seen (including one immature collected) on August 8, 1940, two miles southwest of Patagonia.

Vermivora virginiae. Virginia Warbler. One was seen on July 4, 1940, in a canyon on the south side of the Santa Catalina Mountains, Pima County, in the upper part of the Lower Sonoran Zone. During the breeding season the species is usually restricted to the Transition Zone.

Vermivora luciae. Lucy Warbler. One was seen on September 25, 1940, along the Santa Cruz River near San Xavier Mission. This is the latest date I have found the species in Arizona.

Compsothlypis americana pusilla. Northern Parula Warbler. A molting male (Phillips collection no. 108) was taken by Allan R. Phillips from a flock of mixed warblers and vireos on the Santa Cruz River near San Xavier Mission on March 26, 1938. A female was seen by the author on December 28, 1940, on the western outskirts of Tucson with a small group of Audubon Warblers in a mesquite patch (Audubon Magazine, 43, 1941:139); careful observation was made, so as not to confuse it with any of the Mexican species which might possibly occur in the Tucson region. These are the first and second records for the state.

Dendroica occidentalis. Hermit Warbler. Two, an adult male and a young male, were seen on July 30, 1939, between Columbine and High Peak in the Graham Mountains, Graham County, apparently an early fall arrival date.

Dendroica graciae. Grace Warbler. A male was seen at St. David on April 19, 1939; this is the first lowland record for the state.

Geothlypis trichas chryseola. Golden Yellow-throat. A breeding male taken on June 5, 1940, in the Sulphur Springs Valley about eight miles east of Lowell, Cochise County, is of this subspecies. Yellow-throats in this locality have chosen an unusual nesting site, in that no surface water is present. The plant association consists of a growth of large sacaton (*Sporobolus*) with frequent *Acacia*, *Clematis*, and mesquite.

Piranga rubra cooperi. Cooper Tanager. A male was taken on April 14, 1940, at the Santa Cruz River near San Xavier Mission. This is the earliest spring record for Arizona.

Guiraca caerulea. Blue Grosbeak. A male was seen on October 31, 1939, near Hereford; this constitutes the latest fall record for the state. In the summers of 1939 and 1940, several Blue Grosbeak nests were found in the same area where the Yellow-throats occurred, eight miles east of Lowell. This certainly is an odd nesting habitat for this species, also.

Passerina cyanea. Indigo Bunting. A male was seen on May 10, 1940, at Feldman, Pinal County, in a field along the San Pedro River.

Passerina amoena. Lazuli Bunting. A male was seen on June 25, 1940, at Feldman.

Spinus tristis pallidus. Pale Goldfinch. A flock of eight was seen at St. David on March 1, 1940; and a male was collected at Patagonia on March 21, 1940.

Ammodramus savannarum. Grasshopper Sparrow. Two singing males and a female were seen on May 23, 1940, about six miles north of Elgin; a male and the female were collected. Testes of the male were greatly enlarged. Another male with enlarged testes was taken on May 29, 1940, about two miles north of Elgin. A singing male was seen on June 18, 1940, east of Lochiel in the San Rafael Valley, Santa Cruz County. On August 7, 1940, a male (singing but testes not enlarged) was taken and four others were noted in an alfalfa field along the Babocomari River a few miles east of Elgin. The species was also frequently noted, and taken, during the fall and winter in several localities in southeastern Arizona.

Spizella passerina arizonae. Western Chipping Sparrow. Two females and one male (all adults)

were taken on June 18, 1940, and others were seen at Sunnyside on the west side of the Huachuca Mountains, Cochise County; a pair was taken on June 21, 1940, in Rucker Canyon in the Chiricahua Mountains, Cochise County. These are the first breeding-season specimens to be taken south of the White Mountains in the central part of the state and form the first summer records for the Huachuca and Chiricahua mountains. Chipping Sparrows were found nesting in junipers at Sunnyside in the summers from 1916 to 1937, inclusive, except 1924, by E. C. Jacot, who has informed the author as to their presence. The specimens are all *arizonae*; they show no significant departures in the direction of *S. p. mexicana*.

Spizella pallida. Clay-colored Sparrow. A female was taken from a flock of Brewer Sparrows on March 29, 1940, about eight miles northeast of Elfrida. There are very few authentic records for Arizona.

Spizella breweri breweri. Brewer Sparrow. An adult male was taken on July 2, 1940, a few miles south of Vail, Pima County. This record is considerably earlier than the regular fall arrival in southern Arizona. More normal arrival dates are July 31, 1939 (adult female taken 11 miles north of Douglas), and August 8, 1939 (one taken about five miles northeast of Gleeson).

Spizella atrogularis atrogularis. Mexican Black-chinned Sparrow. This bird was first discovered breeding in the Mule Mountains above Bisbee on July 10, 1939, when two adults and one young were observed. A pair of adults was taken at the same locality on June 14, 1940.

Melospiza melodia saltonis. Desert Song Sparrow. A small population still exists along Sonoita Creek near Patagonia; song sparrows were frequently observed and occasionally taken there. One also was noted on the San Pedro River at St. David on June 28, 1939. It is a common resident along the Gila River at Safford, Graham County, where a male was taken on April 15, 1939, and it has been frequently observed.

Rhynchophanes mccownii. McCown Longspur. The fact that this species has not been noted in southern Arizona for a number of years makes recent observations of interest. It was often seen (usually in company with Chestnut-collared Longspurs) from October 16, 1939 (east of Pearce), to February 20, 1940 (San Rafael Valley), in the Sulphur Springs Valley and in the Sonoita-Elgin-San Rafael region. A female was taken December 5, 1939, about two miles northwest of Elgin.

Calcarius ornatus. Chestnut-collared Longspur. A flock of about 30 was seen at the Randolph Park golf course in Tucson on October 16, 1940. Dr. Charles T. Vorhies informs me by letter that on January 25, 1941, in company with E. C. Jacot, he saw a flock of about 50 at a small watering hole in the Altar Valley about 25 miles north of Sasabe, where Dr. Vorhies took a female. These records are from much further west than the species' usual winter range in Arizona.

Yuma, Arizona, August 5, 1942.

FROM FIELD AND STUDY

Nests in the Cottonwoods at Gustine, California.—Just south of the town of Gustine, Merced County, California, on Highway 33, there is a road that leads into a farm where a colony of American Egrets (*Casmerodius albus*) are breeding in the tops of some cottonwood trees along a stream. It is a place known to many people interested in birds and I have heard various estimates made of the size of the colony. Looking back in my own notes to May, 1939, I read, "There must be more than one hundred birds in the colony." I have heard others suggest two hundred as a probable figure.

This year (1942), on May 30 and 31, Mr. Frank Scott, Mrs. Dorothy Sheldon and I visited the place and Mr. Scott and I made a count of the nests while Mrs. Sheldon was taking moving pictures of the birds. The count was made from the ground with the aid of glasses. I feel sure there was no duplication in the count, but I am not sure that I have not missed some, for in one or two places the leafage made it difficult to see clearly. There are nine trees in line that are being used by the egrets, although when we first saw the colony from the barnyard it looked as though only five or six trees were occupied. There is a constant movement of the birds about the trees, and a constant chatter, almost like domestic fowl, that can be heard from across the field. A Red-tailed Hawk (*Buteo borealis*) was sailing overhead and on the second day when the count was made we found the Red-tail's nest, with two young peering down at us, in the same tree with fourteen American Egret nests.

The heads of the young hawks were still downy but the wings of the one we could best see, because he stood erect, were well feathered out. The hawk's nest was on larger branches than were the nests of the egrets but at about the same level and close to two or three of them. On May 31 we stayed at the site from about 9:30 a.m. to 2:30 p.m. It was just as we were leaving that the adult hawk, which had been sailing in the sky, came down to the nest.

There were two or possibly four Great Blue Herons (*Ardea herodias*) to be seen about the trees and one was sitting on her nest, clearly visible. Another Great Blue's nest was, I think, in the next tree but the leaves were dense at that place and I could not be sure.

There were two pairs of Lewis Woodpeckers (*Asyndesmus lewis*) in this same group of cottonwoods and we watched one pair busily carrying food into its nest hole in a broken branch. Both pairs of Lewis Woodpeckers were doing a good deal of fly catching. They turn in the air with nearly as much skill as the Western Kingbirds that were also about these same trees. The pair of woodpeckers that I watched most closely did almost an equal amount of flycatching and taking of insects from the end of the same dead branch where their nest hole was situated.

The following count was made: Tree 1, 17 American Egret nests and 1 nest that may have been that of a Western Kingbird. Tree 2, 47 egret nests. Tree 3, 7 egret nests; this tree was nearly dead. Tree 4, 14 egret nests; Red-tailed Hawk nest with young; 1 nest that was probably that of a kingbird. Tree 5, 9 egret nests; 2 holes with Lewis Woodpeckers near them, calling. Tree 6, 31 egret nests; 1 Great Blue Heron nest. Tree 7, 24 egret nests; possibly a Great Blue's nest also. Tree 8, 47 egret nests; 1 hole with Lewis Woodpecker going in and out. Tree 9, 2 egret nests; this is a young tree.

The total of American Egret nests was 198. I have not counted the slight accumulations of sticks that seem to have been abandoned before they were finished. Once we saw an egret bringing sticks. Most of the nests seemed to be occupied. Sometimes young birds could be distinguished through the thin platform of sticks. There were many broken egg shells on the ground below. I still do not know whether each nest represents a family or not but I think they are all this year's nests. —HOPE M. GLADDING, *Berkeley, California, June 15, 1942.*

Franklin Gull in Idaho.—That the Franklin Gull (*Larus pipixcan*) should occur at least occasionally within the boundaries of Idaho is a logical certainty, but, so far as is now known, no records for that state have as yet been published. Recent inquiries have disclosed unpublished records, one of which is based on specimens, that will serve to establish this species as a member of the avifauna of Idaho. I am indebted to William H. Marshall of the United States Fish and Wildlife Service, Victor E. Jones of the University of Idaho, Southern Branch, and Lyle M. Stanford of the University of Washington for their several kindnesses in this connection.

Summaries of the various records, arranged chronologically, are as follows: (1) Two birds were seen at Minidoka Dam on July 28, 1910, by Stanley G. Jewett. Attention was drawn to this record, which is on file with the Fish and Wildlife Service, by Marshall.

(2) Two birds were collected in April, 1937, by Buck Cherry approximately four miles west of Meridian, Ada County, near U. S. Highway 30. Mr. Cherry (letter of March 24, 1942) states that

there were approximately a dozen of these gulls feeding in a cow pasture at the time of the collection. The specimens, now mounted (without data) in the State House at Boise, have been identified by Marshall who mentions the deep red bill color and the white primary tips as diagnostic. They have also been seen by Stanford, who concurs with this determination. Attention was first drawn to this record by Jones.

(3) A flock of about fifty birds was seen on May 24, 1941, near Henry, Caribou County, by Victor E. Jones and L. H. Walkinshaw. The gulls were wheeling about high over head and were identified by Walkinshaw as Franklin Gulls.

(4) An unstated number was seen on November 11, 1941, near Springfield, Bingham County, by V. E. Jones and his son. These birds flew over within shotgun range, but were not recognized until too late for a shot.

Finally, Mr. Stanford states that he has seen this species occasionally in the last five years along the Snake River in the vicinity of Weiser and as far downstream as Old's Ferry, on the Oregon boundary, but his notes are not now available for examination.

From the foregoing it would appear that the Franklin Gull occurs occasionally in spring, summer, and autumn at various points along the Snake River drainage in southern Idaho, although additional specimens are needed to substantiate the several sight records. The possibility that breeding colonies may be established in this part of the state seems good, and stragglers might profitably be looked for on the larger lakes of the northern panhandle during migrations.—JOHN W. SLIPP, *University of Washington, Seattle, June 26, 1942.*

Contacts of Ravens with Other Species.—In the past seven years I have observed three instances of contacts between Ravens (*Corvus corax*) and other species that seem worth recording. The raven was attacked in two cases and was the aggressor in one encounter.

On July 10, 1935, on the Flambeau River in Phillips County, Wisconsin, I was watching the activities of a pair of Crows (*Corvus brachyrhynchos*) in the tops of some dead spruce spars. They had young near by. A raven flew past and was immediately assailed by the crows. The squawks of the raven as it twisted and dodged were very much like those of the crows, yet deeper and louder. A few days later (July 12) I watched a raven on a tall snag near its young. A Red-tailed Hawk (*Buteo borealis*) which was soaring in circles chanced to pass near in one of its movements. It was set upon by the raven much in the manner of a crow; the hawk was pursued approximately a mile before the raven gave up the attack.

On April 30, 1942, I visited a cliff in the "scablands" near Lamont, Whitman County, Washington. A Prairie Falcon (*Falco mexicanus*) eirie on the cliff was but a hundred feet from the nest of a raven. The falcon's nest had undoubtedly been used for many years; the accumulation of material probably exceeded a ton in weight and the bottom material was much decomposed. Decomposition takes place slowly in the semiarid atmosphere of this region. The raven nest was apparently a new one. It was placed in a wide crack behind the pillars formed by weathering of the cliff. As my companion and I approached the nest, the raven flew off the nest and away from the cliff. It was immediately set upon by the falcon which launched itself from its nest. The raven wheeled quickly, passed over the cliff and across the highland. It kept a few feet from the ground during its flight, and the falcon gave up the pursuit rather quickly. It appeared that the "hedge-hopping" flight of the raven was a mechanism for making it difficult for the falcon to stoop.

The explanation for the proximity of the nests of the two species seems to be that the raven began nesting before the falcon had returned to the old nesting site. The seven young of the raven were well-fledged, but the falcon nest contained four eggs which did not hatch until the following week.—LEONARD WING, *The State College of Washington, Pullman, Washington, July 20, 1942.*

Blue-winged Teal Nesting in Sacramento County, California.—*On June 4, 1942, Mr. Terrence Potter and I were checking bass nests in the spawning pond at the Elk Grove bass hatchery in Sacramento County, when a pair of Blue-winged Teal (Querquedula discors) alighted close to us in an adjoining pond. The white crescent at the base of the bill of the drake showed very plainly. The large, white spot on either side of the body near the base of the tail was also prominent. I was positive of the identification.*

On June 12, while draining the spawning pond, a male dropped into the pond about 60 yards from us. This was too far to observe the white crescent, but the white spot near the base of the tail showed plainly. Mr. Abe Woodard and Rudolph Gerhardt were with me at the time.

Later the same evening a male and female were in rearing pond No. 8 with a brood of seven ducklings. I had to approach quite close for positive identification because there were a number of

Cinnamon Teal with broods of young. I flushed the Blue-wing drake from the pond and watched it settle in another pond. I again flushed it, and it returned to pond No. 8 where it had been with the female and young. This, in my mind, is pretty convincing that the young were the offspring of these two birds.—C. H. FREYSCHLAG, *Bass Hatchery, Elk Grove, California, July 24, 1942.*

Blue-winged Teal with Young in Honey Lake Valley, California.—On June 17, 1941, Jay Dow and I were driving along the first road to the north of Hartson Lake in Honey Lake Valley, Lassen County, California. As we crossed a small, wet swale a pair of Blue-winged Teal (*Querquedula discors*) was noted close to the road; with them was a brood of young which was without doubt their own. The male was in full breeding plumage and thus was positively identified.—J. S. HUNTER, *Division of Fish and Game, San Francisco, California, July 24, 1942.*

Food of the California Clapper Rail.—The recent article on the food of the Clapper Rail by Moffitt (Condor, 43, 1941:270-273) records crabs as the only crustacean food of 18 California Clapper Rails (*Rallus o. obsoletus*) examined by him, and our perusal of the literature has not revealed others.

To make published data as complete as possible, it seems desirable to record our finding of several amphipods in the upper esophagus of a female Clapper Rail. This bird was collected October 29, 1938, about one-half mile north of Alviso, Santa Clara County, California, as it fed through the low vegetation of the salt marsh. Unfortunately, we have no record of its stomach contents. Another individual was watched for several minutes at distances of a few feet as it foraged among salicornia and sedges. It appeared to be picking small objects from the vegetation, and we supposed it to be feeding on insects and small crustaceans. Two or three small areas of exposed mud were crossed without probing. These observations were made in mid-morning of a heavily clouded, partly drizzly day. The tide was low.

It should be noted that many mud snails (*Ilyanassa obsoleta*), to which the rail paid no attention, were in full view on the surface of the mud. Although not seen on that day, large numbers of the horse mussel, *Modiolus demissus*, were known to occur in the mud of the area. Also present in large quantities was the small mud crab, *Hemigrapsus oregonensis*. Because these species are all mentioned by Moffitt as forming considerable percentages of the stomach contents of the birds examined by him, it is of particular interest that they were not hunted by the two rails we watched, even though known to be present in quantity in the immediate area concerned.—FREDERICK H. TEST and AVERY R. TEST, *University of Michigan, Ann Arbor, Michigan, July 1, 1942.*

The Scissor-tailed Flycatcher on the Florida Keys.—Supplementing previous evidence indicating that the Scissor-tailed Flycatcher (*Muscivora forficata*) is a more or less regular winter visitant to the Florida keys, the authors wish to report four individuals seen January 3, 1942, at the eastern end of Lower Matacumbe Key, abut 80 miles east of Key West. The birds were observed for about ten minutes at distances of 15 to 60 feet while they were perched on wires beside the Overseas Highway and while catching insects on the wing. Because of their short tails and pale colors they were adjudged females.

Previous winter records include five listed by A. H. Howell (Florida Bird Life, 1932:319) for the period from 1885 to 1930, three by Alexander Sprunt, Jr. (personal letter), for the winters of 1937, 1938 and 1939, and one by Joseph E. Warren and Earl R. Greene who recorded two birds seen on December 26, 1941, near Key West (Audubon Mag., supplement, January-February, 1942:34). Howell (*loc. cit.*) also cites five winter records for the mainland of Florida between 1885 and 1930. —GEORGE A. PETRIDES and MIRIAM P. PETRIDES, *Washington, D.C., June 13, 1942.*

An Avifauna from Indian Kitchen Middens at Buena Vista Lake, California.—Excavations of two large shell heaps on the southwesterly shores of Buena Vista Lake, Kern County, California, were made in 1933 and 1934 under the direction of the Smithsonian Institution. These sites were chosen because it seemed likely that they would contain quantities of archaeological material (Wedel, Smithsonian Inst., Bur. Amer. Ethnol., Bull. 130, 1941:194). Most of the remains found there are probably not more than 500 years old. The bones of birds, mammals, reptiles, and fishes, taken from the village middens together with the artifacts, were sent to the United States National Museum for examination. A study of the mammal remains showed that almost every available species

of any size was utilized by the Indians. The bones of dogs, coyotes, and jackrabbits were most abundantly represented in the collection. Four species of birds were identified by Dr. Alexander Wetmore of the United States National Museum, but nearly all of the bird bones remained unclassified. A study of this collection of more than 3000 specimens was recently undertaken by the writer at the suggestion of Dr. Wetmore and Dr. Alden H. Miller.

The following species were found to be represented in the avifauna:

	Number of bones Site 1	Site 2
Gavia arctica. Pacific Loon	1	0
Colymbus nigricollis. Eared Grebe	19	1
Aechmophorus occidentalis. Western Grebe	74	9
Podilymbus podiceps. Pied-billed Grebe	439	9
Pelecanus erythrorhynchos. White Pelican	31	2
Pelecanus occidentalis. Brown Pelican	1	0
Phalacrocorax auritus. Farallon Cormorant	4	3
Phalacrocorax, sp. Cormorant	1	0
Ardea herodias. Great Blue Heron	22	1
Casmerodius albus. American Egret	25	0
Butorides virescens. Green Heron	1	0
Nycticorax nycticorax. Black-crowned Night Heron	30	0
Botaurus lentiginosus. American Bittern	23	2
Ixobrychus exilis. Least Bittern	1	0
Cygnus columbianus. Whistling Swan	4	0
Branta canadensis. Canada Goose	10	1
Anser albifrons. White-fronted Goose	4	0
Anser or *Chen*. Goose	18	2
Chen hyperborea. Snow Goose	1	0
Chen rossi (?). Ross Goose	3	0
Unidentified geese	118	4
Anas platyrhynchos. Mallard	43	3
Mareca americana. Baldpate	16	3
Dafila acuta. American Pintail	22	4
Nettion or *Querquedula*. Teal	24	5
Spatula clypeata. Shoveller	26	3
Nyroca, sp.	73	13
Nyroca affinis. Lesser Scaup Duck	17	3
Glaucionetta, sp. Golden-eye	10	1
Charitonetta albeola. Buffle-head	2	0
Erismatura jamaicensis. Ruddy Duck	283	44
Mergus merganser. American Merganser	38	13
Unidentified ducks	48	10
Accipiter cooperi. Cooper Hawk	2	0
Buteo jamaicensis. Red-tailed Hawk	1	5
Buteo lineatus. Red-shouldered Hawk	2	0
Buteo lagopus. Rough-legged Hawk	4	0
Buteo, spp. Hawks	9	1
Aquila chrysaëtos. Golden Eagle	2	0
Circus hudsonius. Marsh Hawk	6	2
Pandion haliaetus. Osprey	1	1
Falco mexicanus. Prairie Falcon	1	0
Falco, sp. Falcon	8	0
Lophortyx californica. California Quail	2	0
Grus canadensis. Little Brown Crane	2	0
Rallus limicola. Virginia Rail	1	0
Gallinula chloropus. Florida Gallinule	3	0
Fulica americana. American Coot	1310	101
Recurvirostra americana. Avocet	1	0
Himantopus mexicanus. Black-necked Stilt	1	0
Larus, sp. Gull	8	0
Hydroprogne caspia. Caspian Tern	1	0
Zenaidura macroura. Mourning Dove	1	0
Tyto alba. Barn Owl	2	1
Bubo virginianus. Great Horned Owl	2	1
Speotyto cunicularia. Burrowing Owl	0	1
Asio flammeus. Short-eared Owl	20	0
Chordeiles, sp. Nighthawk	1	0
Balanosphyra formicivora. California Woodpecker	1	0
Corvus corax. Raven	6	0
Corvus brachyrhynchos. Western Crow	21	0
Agelaius phoeniceus. Red-winged Blackbird	1	0
Totals	2852	249

As would be expected in a lake shore deposit, the bones of water birds are in the vast majority. The Coot is by far the most abundant species in the collection, represented by 46 per cent of the total number of identified bird bones. Fourteen per cent of the specimens are assigned to the Pied-billed Grebe, and 10 per cent to the Ruddy Duck. All other species taken together constitute but 30 per cent of the assemblage. What combination of factors accounted for the preponderance of these three forms is not known. They are common residents today in the region, but so are other species which are poorly represented here. They may have served as an important source of food for the Indians because they were easily caught. Possibly they were the most abundant game birds throughout the year at Buena Vista Lake.

That bones of almost all of the species of birds were used in several ways is indicated by the presence in the collection of both cut and broken bones. The numbers of the latter are much greater than might be expected to result from natural causes. For example, 738 distal ends of tibiotarsi

were counted in the collection from Site 1, with only 27 proximal ends and 24 complete tibiotarsi! No other skeletal element is represented by more than half this number of bones. Why the Indians should have broken the tibiotarsi just distal to the inner cnemial crest is not clear to me, and I have found in the literature no mention of a similar condition in the collections of bones from other kitchen middens along the California coast. If the legs were broken off when the birds were being prepared for cooking, it seems likely that the tibiotarsi would be broken near the distal rather than the proximal end. It is interesting to note that the smaller collection from Site 2 does not show a comparable disproportion in numbers of tibiotarsi, although some of the bones from this locality were broken in the same way. Except for the fact that there is a gradual decrease in numbers of bones from the surface to a depth of 6 feet in the shell heaps, there does not seem to be any significant difference in the species or the relative proportion of skeletal elements occurring at the various levels at either site.

Two of the species of birds in the collection (*Gavia arctica* and *Pelecanus occidentalis*) are nearly always found along the coasts rather than inland. Perhaps most surprising is the presence of the Brown Pelican, which is practically never found on fresh water. It is represented in the assemblage by a single scapula. The California Woodpecker may seem a little out of place in this association, but oaks probably occurred around the margin of the San Joaquin Valley as they do today. The bird may have been killed some distance from the lake and brought in for its plumage.

The species of birds previously identified by Dr. Wetmore (see Wedel, *loc. cit.*) are: *Plegadis guarauna* (White-faced Glossy Ibis), *Pelecanus erythrorhynchos* (White Pelican), *Grus canadensis canadensis* (Little Brown Crane), and a goose (Anserinae). The ibis was represented by a single specimen from Site 1, at a depth of 1 to 2 feet. Evidently it was not included in the collection sent to the University of California, for no bones assignable to this species were found.

A few forms, such as the Short-eared Owl represented by a fairly complete skeleton, may have left their remains in the deposit quite fortuitously, but it is probable that most of the bones are those of birds used for food by the Indians. Most of the long bones are broken, some have been cut, and some are blackened by fire. Obviously the relative abundance of the various skeletal elements is not normal, but it seems likely that the species found in the deposit are fairly representative of the larger birds occurring in the Buena Vista Lake region.—Ida S. DeMay, *Museum of Vertebrate Zoology, Berkeley, California, April 20, 1942.*

The Yellow Rail and the Caspian Tern in New Mexico.—Presence of the Yellow Rail (*Coturnicops noveboracensis*) at Bitter Lake Wildlife Refuge, 10 miles northeast of Roswell, New Mexico, on the Pecos River, appears to be a new record for the state. The specimen, which was in good flesh, was collected on February 24, 1942, in a dense growth of salt grass.

The occurrence of the Caspian Tern (*Hydroprogne caspia*) also appears to be a new record for New Mexico. Two individuals were seen at Elephant Butte Lake, New Mexico, on February 20, 1942. Neither individual was collected, although the birds were observed through field glasses at a distance of not more than fifty yards.—Clarence Cottam, Clarence A. Sooter, and Richard E. Griffith, *Fish and Wildlife Service, Washington, D.C., May 12, 1942.*

Records of the Herring Gull, Sanderling, and Lark Bunting in Utah.—First intimation that the Herring Gull might occur in the state of Utah was given by E. W. Nelson (Proc. Boston Soc. Nat. Hist., 17, 1875:358) when he listed with a question the species *Larus argentatus*, accompanied by the following comment: "I saw a large gull at the mouth of the Jordan [River] which I am quite sure was this species." An actual specimen did not come to hand, however, until April 27, 1937, when a decomposing bird was picked up on the Bear River Migratory Bird Refuge. This was recorded by Marshall (Condor, 39, 1937:258) who also mentioned that another specimen was later found on the refuge. Stanford (Proc. Utah Acad. Sci., Arts and Letters, 15, 1938:138) recorded a specimen in the collection of the Utah State Agricultural College taken at the Bear River Refuge, November 25, 1937. Since this was contributed by Marshall, it possibly is the second specimen referred to by Marshall (*op. cit.*).

On March 13, 1940, Dr. E. R. Quortrop brought a third specimen of the Herring Gull from the Bear River Refuge to the University of Utah. It had been picked up sick on the refuge in late September or early October, 1939, and was kept alive for some time until it died, presumably of botulism. Then it was placed in cold storage. Upon receipt at the University it was prepared by the writer as a study skin.

On May 8, 1942, the writer visited Egg Island, Great Salt Lake, where thousands of California Gulls were nesting. There a decomposing adult Herring Gull (*Larus argentatus smithsonianus*) was

found. The head and a wing were saved for record purposes and are now in the collection at the University of Utah. On the following day, May 9, 1942, at the Bear River Refuge yet another Herring Gull was seen by the writer in flight and later at rest on a dike with several California Gulls. Both the Herring Gull and its companions were in an immature plumage stage, being darkly mottled rather than immaculate.

These records indicate that the American Herring Gull is more common than generally supposed in Utah, probably being a regular transient in small numbers through the state in both spring and fall. Dr. Nelson's record of so many years ago seems to have been substantiated.

For several years in the spring while enroute to the colonial bird-nesting sites of Great Salt Lake, I have encountered small flocks of Sanderlings (*Crocethia alba*) on the lake. They have usually contained from 30 to 50 individuals. Flying in unison and exhibiting the "flock mind," their wheeling flight maneuvers with flashing white underparts have made impressive sights. On May 18, 1932, at Egg Island, I shot two birds from a flock but retrieved only one because a California Gull (*Larus californicus*) flew off with one Sanderling as soon as it fell in the water. The specimen which I did secure was in the tawny breeding plumage. On May 26, 1932, while visiting Rock Island, Utah Lake, a small flock of Sanderlings was encountered and four specimens were secured. Two were males and two were females, all in breeding plumage. Although Sanderlings were seen near Egg Island on May 7, 1938, no specimens were taken, but on April 21, 1940, one male and two females were secured there. These last specimens were taken about a month earlier than those of 1932 and show the whitish winter plumage rather than the tawny summer plumage. Previous records for Utah are those of Cottam (Proc. Utah Acad. Sci., Arts and Letters, 6, 1929:11) and Hayward (*ibid.*, 13, 1936:192), both of which are for Utah Lake, and Twomey (Ann. Carnegie Mus., 28, 1942:394) for the Uinta Basin.

The only certain records for Utah of the Lark Bunting (*Calamospiza melanocorys*) reported to date in the literature are those of Ridgway (U. S. Geol. Expl. 40th Par., 4, pt. 3, 1877:487) who found a juvenal male at Parley's Park (head of Parley's Canyon, Summit County, not far from Park City) on July 30, 1869, and of Hardy and Higgins (Proc. Utah Acad. Sci., Arts and Letters, 17, 1940:109) who record the species as taken at Washington, Washington County, May 10, 1940. On May 6, 1941, I shot the male of a pair from a cholla cactus on the west slope of the Beaver Dam Mountains, 3300 feet elevation, 5 miles north of the Utah-Arizona border, Washington County. It weighed 37.7 grams. The testes appeared similar in size, the left one measuring 12 x 7 mm.

On May 19, 1941, a Lark Bunting was shot in the barnyard of the Jeremy Ranch, 4300 feet, on the Jordan River, west of the Cudahy Packing Plant, Salt Lake County, Utah. It was a lone bird, as near as could be ascertained. The left testis measured 14 x 8 mm., the right testis 12½ x 10 mm. While considered a transient in Utah, the juvenile of Ridgway and the enormous size of the gonads of the two males of 1941 suggest that the species may nest in the state.—WILLIAM H. BEHLE, *Department of Biology, University of Utah, Salt Lake City, Utah, May 13, 1942.*

White-tailed Kites Feeding on House Mice.—Mr. Merle R. Gross of the United States Soil Conservation Service recently found a "family" of White-tailed Kites (*Elanus leucurus*) in the Granada Hills District, about 5 miles west of San Fernando, Los Angeles County, California. There were two adults and one immature bird. No nest was found, but the kites resorted for perching to a eucalyptus tree in a windbreak in the middle of an orange grove. The tree was about one-fourth mile from a house. Under this tree, on May 10, 1942, Mr. Gross picked up 46 whole pellets and about a dozen fragments. These I analyzed with the following results:

Prey species	No. of individuals in pellets	No. in fragments	Total	Per cent of total
House mouse (*Mus musculus*)	50	12	62	83.78
Meadow mouse (*Microtus californicus*)	8	....	8	10.81
Harvest mouse (*Reithrodontomys megalotis*)	3	1	4	5.41
Totals	61	13	74	100.00

Though there are previous records of other rodents eaten by White-tailed Kites, this is the first instance that has come to my attention in which *Microtus* was exceeded in numbers by any other prey species. Mr. Gross reports that house mice were extremely abundant at about this time, and became especially available when the cover crops were turned under in the orchards. It appears that they were common enough and sufficiently active by day to make up for the local scarcity of meadow mice in the San Fernando Valley.

In picking up pellets from under a roost, there is always a danger that they may be misassigned and erroneous conclusions drawn. In this case, the absence of insects would seem to rule out small

owls and the absence of pocket gophers and *Peromyscus* (both abundant locally but inactive by day) the large owls; the condition of the bone fragments would appear to eliminate the other hawks of the region.—R. M. Bond, *Piedmont, California, June 30, 1942.*

Shower Bathing of a Spotted Towhee.—In the long dry summers of coastal central California, chaparral-dwelling species may find water locally scarce except as it collects on foliage from the nightly fogs that blow in from the ocean. Use of this supply for drinking is probably widespread, but its availability for bathing had not been appreciated by me.

The morning of July 29, 1942, was cool and foggy in Berkeley, and on the hillside at my home above Cerrito Creek in Contra Costa County, the trees and bushes were dripping with water. An adult Spotted Towhee (*Pipilo maculatus*) came to the feeding tray at 7:15 and ate some of the cracked grain offered there. It was a dejected looking individual, with bare patches of skin showing around the head, for it was in the middle of its annual molt; indeed it left a spotted tail feather behind on the tray. It flew but a short distance, stopping on top of a tangle of baccharis bushes and poison oak. At once it began scuttling about under and over the wet foliage, rubbing against it and shaking down drops from overhead. The wings were half spread and were fluttered in the fashion customary in bathing; also the bird bent the legs, crouching down rather than standing normally erect. It moved about within a radius of about two feet, always in the crowns of the bushes, three to four feet above ground. After approximately a minute of this the towhee moved on, but it was detected at a distance, perched, fluttering its wings and preening. The bath was not by my standards especially effective, as the bird was only slightly wet, but it had apparently satisfied an instinct at least. All this time there had been a pan of water on the feeding tray but it was small and fairly deep and evidently was not so stimulating of the bathing reaction as the natural supply of water.—Alden H. Miller, *Museum of Vertebrate Zoology, Berkeley, California, July 29, 1942.*

Notes on the Occurrence of Some Pelagic Birds Off San Diego County, California.—The ever moving and changing stretches of the ocean offer many hazards and inconveniences to the ornithologist. Hence our knowledge of the birds which come and go over the open sea, seldom touching our shores, is limited when compared with the mass of information that has been gathered on the subject of land birds. The following notes and observations are submitted in the hope that they may provide a small addition to the published facts in the interesting field of pelagic birds.

The status of the Slender-billed Shearwater (*Puffinus tenuirostris*) along the Pacific coast, especially to the southward, appears to be rather uncertain. There are scattered records of birds found dead on the beach and of several collected specimens, but the occurrence of this species in large numbers in the winter of 1941-42, near La Jolla, California, is noteworthy.

The first of these birds to come to my notice was a dead female (now in the San Diego Natural History Museum) which I picked up on October 28, 1941, on the beach just north of La Jolla. It had evidently been dead for several days. On examination I found that its stomach and intestines were packed with food and that a fair quantity of fat lined the skin. Death probably resulted from the battering of recent heavy seas. The second bird was found dead, in an emaciated and somewhat decomposed condition, on October 30, 1941, near La Jolla. Two unidentified round worms over an inch long were found in its gullet. A third bird, very much decomposed, was found on November 4, 1941, on the Silver Strand about 4 miles south of Coronado.

I saw my first living Slender-billed Shearwater on November 5, 1941, 1½ miles off La Jolla. Several hundred Black-vented Shearwaters (*Puffinus opisthomelas*) were scattered over a large stretch of glassy sea surface. Among them, a few dark shearwaters were noted. One of these, a Slender-bill, was collected and is now a study skin in my collection. This group of Slender-billed Shearwaters was exceptionally easy to approach. Several times I was able to bring my skiff to within about ten feet of them before they reluctantly exerted enough energy to patter and glide several hundred feet before resting on the surface again. The stomach of the specimen collected was full of fish. This perhaps accounted for the sluggish actions of the birds.

In the late afternoon of November 29, 1941, I again looked for shearwaters off La Jolla. After proceeding over a mile from shore in my outboard motor boat, I encountered two Black Brant (*Branta nigricans*) floating on the water and numbers of Heermann Gulls (*Larus heermanni*) resting on kelp and driftwood, but no shearwaters. After about an hour's fruitless search, I noticed a long and narrow raft of what proved to be several hundred Brandt Cormorants (*Phalacrocorax penicillatus*) lying nearly submerged, with only their long necks and a spot of their backs above the surface. I cruised beside this linear group for perhaps 100 yards and then noticed two dark shearwaters on the water. Since it is difficult to be sure of the identity of such birds in the field, I shot one. It proved

to be a Slender-billed Shearwater. The birds were very tame and the one collected was so gorged with fish that as I gathered it from the water several large fragments dropped from its mouth. These two individuals and a third one identified as the same species constitute all the shearwaters seen on this trip.

On December 4, 1941, after several days of heavy seas, one dead and one very weak Slender-billed Shearwater were found on the beach. The weakened bird died within an hour of the time it was found.

On December 16, 1941, while walking on the beach a little south of the Scripps Institution of Oceanography, I noticed a large group of birds, about a quarter of a mile beyond the breakers. Anxious to see if there were Slender-bills among them I got my skiff and rowed out. The shearwaters, well over 200 in number, were apparently "chock full." They sat about lazily for the most part and few seemed able to summon the energy for a take-off. I watched several dive and appear again at the surface, swallowing large sardines. From two to five gulls were usually on hand and attempted to steal the fish, but each time the shearwater ducked back below the surface and apparently finished the meal under water. I was able to get very close to many of the birds and think that, except for about 70 or 80 Black-vented Shearwaters, they were all of the slender-billed species.

On December 25, 1941, five Slender-billed Shearwaters were found dead along a half mile stretch of beach north of La Jolla. The weather previous to that date had been very severe for nearly a week. On December 27, three more were picked up along this same stretch of beach.

Apparently the Slender-billed Shearwater is not as rare a visitor along our coast as the few published records would lead us to believe. Although this season may be one in which these birds have been unusually abundant, I am inclined to believe that they are generally more common than has been supposed. In the first place their appearance in the field is nearly identical with that of the common Sooty Shearwater. Thus their presence could easily be overlooked. Even dead birds in the hand can be puzzling, unless measured or compared with specimens of the Sooty. It is certainly possible that many dead shearwaters on the beach have been passed by as being of the larger species.

Stomach contents of four Slender-billed Shearwaters, which seemed of special interest, were: bird shot November 29, 1941, 15 small clear white quartz pebbles; one bird found dead on beach December 4, 1931, 25 round worms, 3 small pebbles; the other bird found on same date, several round worms and 2 small squid beaks; bird found dead on beach December 25, 1941, 78 small squid beaks and about 15 small round worms. Several other birds examined contained fish only.

Although the occurrence of the Ancient Murrelet (*Synthliboramphus antiquus*) is to be expected along the coast of southern California, the bird is perhaps still sufficiently rarely seen to warrant presenting the following records of this species. On January 2, 1935, a lone bird, now in my collection, was collected about a mile off La Jolla. Again on January 2, but in 1941, I collected two specimens from a small flock of eight birds less than a half mile from shore at La Jolla. Another small flock of six birds was seen later, farther out. The following day I returned, hoping to collect another specimen, but no Ancient Murrelets were to be found. Of the two secured, one is in the San Diego Natural History Museum and the other in my personal collection. On January 14, 1942, an energetic Ancient Murrelet, together with a Rhinoceros Auklet (*Cerorhinca monocerata*), was observed, while feeding just beyond the breakers in the churning froth only a few feet from the rocks in front of the La Jolla Caves. On January 15, 1942, a dead Ancient Murrelet was found.—KARL W. KENYON, *San Diego Society of Natural History, May 22, 1942.*

Melospiza melodia virginis a Synonym of Melospiza melodia fallax.—Dr. Clarence Cottam had the kindness to call to the attention of Dr. William H. Behle and myself (co-describers of *Melospiza m. virginis* from the Virgin Valley of Utah) the fact that *virginis* is identical with Baird's type of *fallax* from Pueblo Creek, Arizona. Through the courtesy of Dr. Alexander Wetmore, the United States National Museum has forwarded me this type and also the type of *Melospiza fasciata montana*. Since I am responsible for the taxonomic portion of the paper in which *virginis* was described (Condor, 44, 1942:122-124), I feel it my duty to declare the changes in nomenclature which are necessitated by my findings upon comparing these types with specimens of *virginis*. I agree with Cottam that *virginis* is a synonym of *fallax*. The type of *fallax*, a wintering bird, has a ruddy color and lacks black streaks; it is, therefore, a good representative of the song sparrow population breeding in the Virgin Valley and adjacent parts of Nevada. As previously pointed out, this population is racially distinct from, and geographically and ecologically isolated from *saltonis* and from the black-streaked song sparrows occurring at higher elevations to the north and east. The type of *montana* is identical with representatives of this latter population in the Museum of Vertebrate Zoology; accordingly, *Melospiza melodia montana* should be reinstated as the correct name of the Mountain Song Sparrow.—JOE T. MARSHALL, JR., *Museum of Vertebrate Zoology, Berkeley, California, August 19, 1942.*

NOTES AND NEWS

Fig. 78. Charles E. Hellmayr, Associate Curator of Birds, Field Museum of Natural History. Author of the later parts of the "Catalogue of Birds of the Americas."

REVIEW

Recently I have heard recordings of bird songs some of which are, frankly, good. But there is no way to replace the song of the bird as heard first-hand, so that all such bird records are inadequate, to my mind at least. Recorders of bird music may well be surprised at the much more pleasing effect of a recording issued by the University of California Press (Berkeley and Los Angeles) of Dr. Loye Miller's informal talk on "Music in Nature." Dr. Miller illustrates his discussion of bird talk and song, the characteristics of sound and music (time, tone, tune, timbre, touch), with his own vocal and whistled imitations, and the whole performance is not only as good as many actual bird recordings, but it brings the voice, thought, and personality of our beloved Cooper Club member as well. Highlights of the imitations are the four calls and the song of the California Quail, and the songs of the creeper, wolf, Spotted Screech Owl, tree frog, and meadowlark. Although I have not heard the Sandhill Crane, I am greatly impressed with Dr. Miller's three-toned imitation, combining a tongue flutter, a whistle and a grunt! I cannot imagine a more delightfully original talk than this. Dr. Miller's system of analyzing sound is all his own (musicians may throw up their hands at the term "touch" applied to music, meaning *accent* and *inflection*). I do not agree strictly with some of his imitations: the grace note is omitted from the horned owl's hoot, the inflections used in the Russet-backed Thrush call and poor-will song are not as I have heard them, nor does his chickadee's song have the usual time intervals. But his concern is not in giving strict imitations; it is with interesting bird students in appreciating birds through sound as well as sight. Conversing with birds not only has great practical values in facilitating the taking of specimens and studying territorial responses, but is most pleasing, and at times really exciting, as anyone who has called up a Spotted Owl will admit! I advise the bird student who is eager to take up Dr. Miller's challenge to go out and converse with birds to be patient. It took me months to get that "very low falsetto" for the horned owl, but my immeasurably increased knowledge and enjoyment of horned owls since then has certainly made the effort worthwhile.—JOE T. MARSHALL, JR.

MINUTES OF COOPER CLUB MEETINGS

NORTHERN DIVISION

APRIL.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, April 23, 1942, at 8:00 p.m., in Room 2503 Life Sciences Building, University of California, Berkeley, with Vice-president R. M. Bond in the chair and about 35 members and guests present. Minutes of the Northern Division for March were read and approved. Three names were proposed for membership: Marjorie Lee Guest, 4403 Marlborough Drive, San Diego, California, and Telford Hindley Work, 587 Alvarado Row, Stanford University, California, both by Alden H. Miller; Thomas Allen Smith, 843 Indian Rock Avenue, Berkeley, by Amelia S. Allen. A report of the sixteenth annual meeting of the Cooper Club at San Diego, April 3 to 5, was received from the secretary of the Southern Division, Jack C. von Bloeker, Jr.

Milton Seibert opened field observations with the report that a mockingbird in east Oakland had been singing for several weeks. He had noted the nest of a Red-breasted Nuthatch April 12. Mr. Alden Miller said that a Red-breasted Nuthatch west of the Life Sciences Building had been giving the call associated with nesting. Mrs. Kelly had recorded a Tolmie Warbler in Garber Park on April 21. Mrs. Allen was able to give April 7 as the date of their arrival. She said the Townsend Solitaire in Strawberry Canyon was still present on April 18. At the Alvarado ponds on April 11 she had seen 8 Black-necked Stilts.

Two Burrowing Owls were seen on a near-by fence. Mrs. Bracelin reported that the Western Flycatcher had arrived on the campus on Easter Sunday (April 5) and at Golden Gate Park, San Francisco, a day later.

Mr. Frank A. Pitelka spoke on "Territory and Related Problems in Hummingbirds" (see pages 189-204 of this issue of the Condor).

Adjourned.—FRANCES CARTER, *Recording Secretary.*

MAY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, May 28, 1942, at 8:00 p.m., in Room 2503 Life Sciences Building, University of California, Berkeley, with President E. Lowell Sumner, Jr., in the chair and about 35 members and guests present. Minutes of the Northern Division for April were read and approved. Three names were proposed for membership: Otto William Geist, University of Alaska, P. O., College, Alaska, by Hilda W. Grinnell; Miss Betty Hammerly, 1142 Amador Avenue, Berkeley, by Mrs. H. P. Bracelin; Albert John Wool, 147 Lexington Avenue, Redwood City, California, by Alden H. Miller.

Mrs. Bracelin read a personal letter from Florence Merriam Bailey, written at the time of the death of her husband, Vernon Bailey. It was unanimously decided that the Club send resolutions of sympathy to Mrs. Bailey.

The program of the evening was devoted to field notes. Mr. Walton Breed introduced himself as a member attending the Northern Division for the first time. From May 20 to 24 he had carried out detailed observations on a pair of Sparrow Hawks which were exceedingly active about the Berkeley Inn and the Medico-Dental Building in spite of the Telegraph Avenue traffic. Milton Seibert presented data on nesting in the Livermore region. His last local date for the Gambel Sparrow was May 3, and a Golden-crowned Sparrow was recorded on the same day. Mr. Harwell brought an interesting list from the Transition Zone of Napa County, which resembles the association in Yosemite; included were Western Tanager, Black-headed Grosbeak, Robin, Mountain Quail, Red-bellied Hawk and Anthony Green Heron. Mrs. Allen commented on strange songs uttered by Spotted Towhees, in Strawberry Canyon and Hamilton Gulch, Berkeley, and at Boulder Creek, Santa Cruz County.

Dr. Haley gave a less recent observation. He remembered, at the age of 6 or 7 years, being taken by his father to see 3 Passenger Pigeons, in a trap at a railroad east of the White Mountains of New Hampshire. Dr. Ritter, he said, had in early days seen the pigeons nesting.

President Sumner announced with regret that Vice-president R. M. Bond would soon be transferred to Portland, to the new headquarters of the Soil Conservation Service. Mr. Bond presented Sally, a native of Colorado. She is a young Prairie Falcon, trained by the Freshman Dean at Colorado College.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

JUNE.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, June 25, 1942, at 8:00 p.m., in Room 2503 Life Sciences Building, University of California, Berkeley, with President E. Lowell Sumner, Jr., in the chair and 41 members and guests present. Minutes of the Northern Division for May were read and approved and minutes of the Southern Division for April were read. Two names were proposed for membership: George A. Bartholomew, Biological Laboratories, Harvard University, Cambridge, Massachusetts, by Alden H. Miller; and Ernest B. Woon, Route 1, Box 259, Gilroy, California, by Hilda W. Grinnell.

President Sumner read a letter of sympathy to Florence Merriam Bailey written by a committee consisting of Joseph Dixon, chairman, Robert Orr, and Seth B. Benson. Mrs. Grinnell reviewed "Ornithologists of the United States Army Medical Corps" by Edgar Erskine Hume.

Mrs. Kelley opened the Field Notes with a report of a pair of Audubon Warblers feeding an almost full grown young at Kentfield, Marin County, on June 14. Joe T. Marshall, Jr., found nearly grown creepers at Sequoia Park on June 21. Robert W. Storer reported a Sparrow Hawk nest in a hole in the front of a brick building on Telegraph Avenue, Berkeley, between Channing Way and Haste Street. This is probably the nest of the pair reported on by Mr. Walton Breed at the May meeting. Mr. Frank Scott mentioned his having seen ivory-billed woodpeckers and whooping cranes on his recent trip across the continent.

President Sumner then introduced the speaker of the evening, Mr. Joe T. Marshall, Jr., who gave a paper on "Some Birds of El Salvador." Mr. Marshall spent five months, from December to May, in El Salvador with an expedition sponsored by the University of California. Approximately one-fourth of the birds encountered were species which are resident both in the United States and El Salvador, another fourth were wintering species which breed in the United States, another fourth were species closely related to North American forms, and the remaining fourth were unique to tropical America. Among the more exotic birds obtained were tinamous, curassows, trogons, motmots, woodhewers, manakins, and honey creepers. Mr. Marshall il-

lustrated his talk with a representative series of bird skins which were examined with much interest after the close of the meeting.

Adjourned.—ROBERT W. STORER, *Acting Secretary.*

SOUTHERN DIVISION

MAY.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held on Tuesday, May 26, 1942, at 8:00 p.m., in Room 145, Allan Hancock Foundation, Los Angeles, with President Sherwin F. Wood in the chair and 97 members and guests present. Minutes of the Southern Division for April were read and approved. The following applications for membership were read: Gus F. Augustson, Allan Hancock Foundation, University of Southern California, Los Angeles, California, proposed by Jack C. von Bloeker, Jr.; Frank J. Hinds, 922 Academy, Kalamazoo, Michigan, proposed by Josselyn van Tyne; and Clinton McBee, Prosser, Washington, proposed by Stanley G. Jewett.

President Wood then introduced Mr. Ed N. Harrison and Mrs. Frances S. Roberts, of Encinitas, California, who presented their very excellent Kodachrome motion picture, entitled "Birds of the Pacific Coast." The first half of the film illustrated the nesting habits of the Spotted Sandpiper, Nighthawk, and Townsend Solitaire, and the latter half showed the winter activities of ducks, geese, and swans at the Tule Lake Refuge, Siskiyou County, California. A sincere expression of appreciation was extended by the Southern Division to Mr. Harrison and Mrs. Roberts for their important work in permanently recording for science the life histories of these birds.

Adjourned.—JACK C. VON BLOEKER, JR., *Secretary.*

JUNE.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held on Tuesday, June 30, 1942, at 8:00 p.m., in Room 145, Allan Hancock Foundation, Los Angeles, with President Sherwin F. Wood in the chair and 104 members and guests present. Minutes of the Southern Division for May, 1942, were read and approved. The following applications for membership were read: Mary Louise Fagley, Laboratory of Ornithology, Fernow Hall, Ithaca, New York, proposed by Allan R. Phillips; David J. Howell, 4135 Regnan Blvd., Los Angeles, Calif., proposed by Adriaan J. van Rossem; and Dr. Frederick Kline, 3922½ Wisconsin Place, Los Angeles, Calif., proposed by Jack C. von Bloeker, Jr.

The following resolutions concerning the death of William A. Bryan, Honorary Member of the Club, were presented:

Whereas, in the death of William Alanson Bryan, a member of the Cooper Ornithological Club since 1921 and an Honorary Member since 1940, this organization has lost a distinguished member and steadfast friend, and

Whereas, his interest in the field of zoology resulted in the production of numerous publications of outstanding scientific value on the fauna of the Hawaiian Islands and other localities, and later on led to his connection with the Los Angeles Museum, which, under his directorship, achieved wide reputation as a scientific institution,

Now therefore be it resolved, that the Southern Division of the Cooper Ornithological Club expresses its sorrow at this loss to the Club and to the science of ornithology, and

Be it further resolved, that a copy of these resolutions be sent to the family of the deceased, and that another copy be spread upon the minutes of this organization.

Upon motion by George Willett, seconded by Dr. Louis B. Bishop, and unanimously carried, the resolutions were adopted.

A recommendation for election of Harold M. Michener and Josephine R. Michener, of Pasadena, California, to Honorary Membership in the Cooper Ornithological Club, in recognition of their outstanding contributions to ornithology through the medium of bird banding, was read before the Southern Division. The Secretary was instructed to transmit a copy of these nominations to the Corresponding Secretary of the Northern Division.

In response to a call for recent observations, J. S. Appleton reported seeing three California Condors feeding in the Simi Valley approximately two weeks ago.

President Wood then introduced the speaker of the evening, Dr. John S. Garth, of the Allan Hancock Foundation, University of Southern California. Dr. Garth gave an interesting lecture entitled, "Oceanic Birds of the Southeastern Pacific," based upon his experiences and observations as a member of the Hancock Pacific Expeditions to Central and South America. His topic was illustrated with 80 photographic slides and three reels of motion pictures taken on expeditions to the Galapagos Islands, Ecuador, and the bird islands of Peru.

An invitation was extended to everyone present to visit the laboratory of ornithology in Room M-231 after the close of the meeting. Specimens representing species referred to in the evening's lecture, which were collected by Granville P. Ashcraft on the 1938 and 1939 Hancock expeditions, were arranged in the laboratory for close inspection by interested persons.

Adjourned.—JACK C. VON BLOEKER, JR., *Secretary.*

For Sale, Exchange and Want Column.—Each Cooper Club member is entitled to one advertising notice in any issue of The Condor free. Notices of over ten lines will be charged for at the rate of 15 cents per line. For this department, address JOHN McB. ROBERTSON, Buena Park, California.

BIRD REFERENCE work of any kind done at the U. S. National Museum for distant ornithologists. I have full access to the collections and library. Terms: 50 cents per hour. Address: DR. E. M. HASBROUCK, *U. S. National Museum, Washington, D. C.*

FOR SALE—Bent's "Life Histories of North American Birds": No. 130, $5.00; No. 135, $7.50; No. 142, $4.00; No. 146, $4.00; No. 162, $8.00; No. 176, $2.00 (all uncut, as issued). Griscom's "The Distribution of Bird Life in Guatemala," as new, $2.00. Fisher's "Hawks and Owls of the U. S." (one plate missing), $4.00. "Zoe," complete as issued, $4.50. Woodruff's "Birds of the Chicago Area," $1.00. Coues' "Birds of the District of Columbia," 75 cents. Miller's "Families and Genera of Bats" (Bull. 57), $1.00. Postage prepaid in United States.—LAURENCE M. HUEY, *Natural History Museum, Balboa Park, San Diego, California.*

FOR SALE—"Illustrations of the Nests and Eggs of the Birds of Ohio with text"; illustrations by Mrs. N. E. Jones, text by H. Jones; 2 vols. folio, 1879-86. This work is one of the rarest of American ornithologica, only 90 copies were issued, and it has been favorably compared to Audubon's works. Have a set of this rare book to sell and will be glad to quote prices to interested parties.—MRS. L. H. MEARNS, *313 South Court St., Circleville, Ohio.*

WANTED—For cash or exchange: Taxidermist, April and June, 1892; Ocean Ferry, June, 1922; Recreation, August, 1899, and February, 1908; Science, Nov. 5, 1913, and May 10, 1918; Journal Washington Academy of Science, Jan. 19, 1919.—W. D. HOLLISTER, *1755 High St., Denver, Colorado.*

WANTED—Will pay cash for caliper suitable for measuring bills, tarsi, etc., with vernier or other device registering down to 1/10 mm. Also, Ridgway's "Color Standards." What do you ask?—LAIDLAW WILLIAMS, *Box 453, Carmel, California.*